SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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Original Correspondence.

NOTES ON THE DISPUTES IN YORKSHIRE.

Sir,—What a pity it is that in this country there should be such enes as are witnessed almost daily in the South Yorkshire district. tters of the most diabolical nature are sent by the workman to his ployer; acts of violence by one workman to another, thus upsetg all domestic comfort. Men do and must necessarily differ in inions and creeds, but surely they may agree to differ, and allow ch other the same freedom they claim for themselves.

For some years a severe struggle has been raging between the comned strength of the Miners' Association and the proprietors of veral collieries. Some months ago picked men of this association ere sent to make wider the breech, by taunting and foolish language wards these employers, and by crafty and assuring language to the en, and not unfrequently under the cloak of, and hypocritical use the forms of, religion. Oh! when leaders of the people seek to ind the ignorant with the admixture of truth and falsehood. Under ese circumstances, our English collier is subjected to the same mning influence as the poor priest-ridden Irishman, and is more avily taxed with Peter's pence. The public have watched this ntest with regret, and perhaps with divided sympathies, as they uld not go altogether with the policy of the employers, because ey had observed some for years use their influence to impede and vert measures for the better protection of human life. It seemed, erefore, desirable that the workmen should be alive to their own terests, and if combination for the double purpose of "Mutual surance" and of obtaining money-power and political influence as indispensible, it was their full right to try it. But herein lies e difficulty—in all classes of society the sudden acquisition of great wer brings with it a strong temptation to the abuse of that power, nd it was not, therefore, to be wondered at that the colliers were at mes unable to resist the advise of the restless and designing; hence e capricious closing of large pits for the purpose of having a holiy, and the indulgence in a defiant manner, and in unnecessarily ffensive and irritating language, towards those whose duty it is to aintain order and to prevent waste, which has very materially inured their cause; and the very institution which was indeed able ith judicious management to benefit them has, by a misuse of the owers, done them immense harm, not only in the opinion of the ublic but in their social position, and so impoverished the entire lass that thousands of them will never be able to extricate themselves.

It hardly seems creditable that men could be induced to such a andom course, when exhaustion must be the penalty to themselves r their employers. Thus one body of men leave their work because he terms do not suit them, whilst another body of men take to their laces because the terms to them are satisfactory. The men who eft were free to do so; the men who took to their places were qually free. There is no excuse, then, for violence either on the ne side or the other. Ours is a free country. The law of the land s the embodiment of the will of the people, and under it men of all lasses are protected in their sacred right to dispose of their labour r their goods on their own conditions. Any attempt to over-ride he law will not fail to alienate public sympathy, and to bring its uthors into trouble. The statutes of the realm are as a wall, and e is no friend to the working classes who encourages them to run heir heads against it.—*Jan.* 19. A.

THE IRON MANUFACTURE OF SOUTH STAFFORDSHIRE.

CORNGREAVES IRON WORKS.

Sir,—These extensive works, as now carried on by the New British Iron Company, comprise blast furnaces, puddling forges, and rolling mills, and the coal and ironstone mines which supply the works with fuel and iron ore. There are six furnaces built, four of which are now in blast; they are all round, brick-built, hooped with iron, and standing on square brick pillars. The gases escaping from the top of the furnaces are not utilised; both stoves and boilers are fired with coal or slack. Four of the furnaces are placed together in a line; they are 46 ft. high, 15 ft. and 13 ft. 8 in. wide at the boshes, and 8 ft. and 7½ ft. diameter in the hearths. The average production of pig-iron from each is 220 tons per week. The material is raised to the top of these furnaces by a 14-in. vertical direct-acting engine lift, two carriages vertical for two furnaces, and by a vertical pneumatic lift worked by the blast engine for the other two. The blast is heated so as to be about 400° at the tuyeres. To effect this there are two stoves of the syphon form, 12 ft. long; 10 by 3 in. inside, 30 pipes in each stove, and four stoves of the 4½-in. round twin-pipe pattern; each stove contains twenty-four pipes, 12 ft. in length, arranged in a circular position. The other two blast furnaces, built a little apart from those just described, are 42½ ft. high, 17 ft. wide at the boshes, 9 ft. at the hearth. One of these is now in operation, producing 240 tons of pig-iron on an average per week; the maximum make is 275 tons. The blast is supplied at 400° temperature at the tuyeres. There are four stoves built for these furnaces, of the syphon form, 30 pipes in each stove. The material is raised to the top of the furnaces by a 24-in. direct-acting vertical engine, vertical lift, with two carriages. There are eight tuyeres to each furnace—three at each side, and two behind. The tuyeres used are patented by Mr. Hodgetts, the furnace manager, the principle of which is a series of jets of cold water thrown internally against the nose end of the tuyere, which it is stated prevents the serious accidents which have occurred with the usual form of tuyere adopted in South Staffordshire, affording greater durability, and saves time in changing.

There are two blast-engines in separate houses to supply the whole of the furnaces; they are beam-engines, condensing. No. 1 has a 51-inch steam-cylinder, 103½-in. blowing-cylinder, at opposite ends of the beam, 8-ft. stroke; has cam gearing, goes at present 13 strokes per minute, but has gone 17 strokes. The rim of the fly-wheel weighs 20 tons, and the wheel is actuated by the extension of the beam over the steam cylinder. No. 2 engine has one 52-in. steam-cylinder, one 102-in. blowing cylinder, 8-ft. stroke, similar in construction to the other, excepting the valves are worked by the air-pump-rod. There are five plain cylindrical boilers to each engine. A tank on the top of each house is supplied with water by a pump connected to each engine; from these tanks the tuyeres and tymps are fed with water. The materials used in furnaces are the native ironstone mixed with hematite, wenlock limestone, and coke exclusively. The ironstone is calcined in open clamps. The coke is made solely from the Thick coal, in open hearths; the produce of coke is about 55 per cent. There are 150 of the coking chimneys, about 8 ft. high, the coal in each heap being placed around six of the chimneys in a line. The principal part of the production of pig-iron is converted into finished iron at the company's forges and mills at Corngreaves and Brierley Hill. The Thick coal is used again in the puddling and mill furnaces; the effect of these arrangements is to produce iron of the first quality, the Lion brand is considered equal to any in the district, and such as has given to South Staffordshire its name for high qualities of wrought-iron.

The Puddling Forges and Rolling Mills.—At Corngreaves there are 40 puddling furnaces and 18 mill furnaces; these furnaces have each an independent stack, the waste heat is not applied in anyway to heating boilers. The machinery consists of one 43-in. condensing beam-engine; this drives a 16-in. mill, capable of rolling bars 6 in. round or square, having two pairs of rolls, also a rod-mill, having two pairs of 16-in. rolls. On the other side is a puddling forge, having one pair of rolls and a 7-ton helve hammer. Another 43-in. condensing beam-engine drives a puddling forge on each side of it, having each two pairs of rolls and a helve hammer. Another planishing hammer near these is driven by a small engine. These three forge trains and two mills are all in one line. Another line of mills, at right angles to the former, consists of one 46-in. condensing beam-engine, which drives a 20-in. plate mill, having two pairs of rolls and a pair of blooming rolls at the end. On the opposite side of the engine are a 10-in. mill, with three pairs of rolls, and an 8-in. guide mill, with three pairs of rolls. Connected with the plate mill there is a pair of shears 10 ft. wide, driven by a belt from the main shaft, and with the large mill there is a saw driven by a rotary steam-engine. There are also seven other pairs of shears for cropping and cutting down the bars; these take their motion from the main shafting. The puddling furnaces branch off in lines from the several forges, the whole is enclosed under wrought-iron roofing, and is in full activity. The make of iron, comprising merchant iron, boiler, and other plates, nail rods, hoop, strip, angle, T, sash iron, &c., amounts to about 500 tons per week.

Fire-bricks of the Stourbridge quality are extensively manufactured here for use in the works. A 13-in. non-condensing beam-engine is used for this purpose. The clay is ground, afterwards elevated twice, riddled, and tempered ready for use by self-acting machinery; it is then moulded into bricks by hand. The make is about 16,000 per week; the clay is obtained from the company's Codsall pit. A 10-in. horizontal engine is also used in making red bricks. An 18-in. non-condensing beam-engine is used to drive two saw mills, one self-acting. A 14-in. horizontal non-condensing engine in the fitting shop drives five lathes—one shaping, one drilling, and one planing machine used for fitting railway points. A shop is appropriated to lathes for turning rolls, which will hold six pairs of rolls. The smiths' shops contain six fires, blown with fan blast, where only the local work and chain making is carried on. Three tank locomotives convey materials between the collieries and iron works, running on a 3 ft. 2½-in.; two of these have a pair of 11-in. cylinders, 18-in. stroke, and one a pair of 9-in. cylinders, 16-in. stroke.

Coal and Ironstone Mines.—At *Codsall* there are two pits, 7 ft. in diameter, 10 yards apart, in front of the engine, draw Thick coal to the extent of 150 tons per day. At *Timbertree* there are two 7-ft. pits in front of the engine, sunk to the white stone; the Thick coal is here 30 ft. in thickness, and about 200 tons per day is raised. At *New Bear Moor* two pits are sunk in front of the engine, at one of these Thick coal ribs and pillars, Heathen coal, and Gubbin stone are raised, to the extent of 100 tons per day. At *Black Wagon* two pits are sunk in front of the engine, one used for drawing water, the other for raising ribs and pillars from the Thick coal, the Heathen coal, and Gubbin stone, to the extent of 120 tons per day. At the *Fly Pits*, similarly situated to the others, one pit is used in raising the ribs and pillars of the Thick coal, to the extent of 100 tons per day. At these five plants, four condensing beam-engines are placed, the cylinders are 32, 28½, 26½, and 24 inches in diameter, and one 28½-in. non-condensing beam-engine. The *New Hawne* pits are sunk on the south side of the Timber-tree fault, a downthrow to south 27 yards. There are two pits in front of the engine-house, 8½ feet diameter, 13 yards apart at their centres, and 268 yards deep to the Thick coal seam; the pits are walled throughout with bricks and mortar. The winding engine has two 23-in. horizontal cylinders, 4-ft. stroke, direct action, one plain drum, 12 ft. in diameter, round wire ropes. This engine is non-condensing, and was made at the Corngreaves shops. A cage is run in each shaft, each cage runs on two wire rope guides, and carries one tub of coal, holding from 12 to 16 cwts. A strong feeder of water was got in sinking the pits, which continues little diminished; a pumping engine is required for this—it is a 20-in. vertical cylinder, 4½-ft. stroke, on second motion, 6-ft. stroke in the pit. The water pit is sunk within the same engine-house, and the engine is fixed at the top of it under the floor. The pumps are 8½ in. diameter, the depth is 90 yards; 7 strokes are made per minute in the pump, day and night. A donkey engine, also in the house, is used for lowering or raising men in the water pit. Four plain cylindrical boilers supply these engines with steam.

The Thick coal seam, at the bottom of the New Hawne pits, is of Top coal, 13 ft.; rock, 6 ft.; Bottom coal, 12 ft. To the north the rock decreases in thickness, and the seam rises about 2 in. per yard; to the south the workings have extended 420 yards from the pits, and the rock has increased to 30 ft. The coal, besides, is much intermixed with batt in that direction, which may be owing to its proximity to another fault. The top coal only is got at present, about 300 tons are raised per day. The colliery has been in operation about three years, the workings being on the southern limits of the coal field; in regard to the extent and quality of which beyond this great uncertainty prevails. No fire-damp is produced in this mine, a little choke damp is found, natural ventilation is depended on, no furnace, or other aids to ventilation, is used at this pit, nor at the other pits before named. There are 28 horses employed underground, wood tubs are used, with 10-in. flanged wheels on a 3-ft. gauge.

Considerable attention is given to the screening at the top of these pits. There are two inclined screens for the large and mixed coal, with hoppers under them. The coal passing through these screens is raised by a bucket elevator from each to a rotary screen, placed midway between the inclined screens. The rotary screen is double, one rotating within the other. The coal is delivered first into the inner screen, which produces nuts; what falls through goes to the outer screen, which produces ¼ inch small; the duff falls through it. Each of these screens rests on four pullies at the outer rim; the pullies are turned by bevel wheels and shafting connected to the pumping-engine, and these give the rotary motion to each screen.

Great interest is now felt in any extension of the known limits of the South Staffordshire coal field, as without its well-known iron-producing minerals the manufacture of high qualities of iron cannot be maintained. Two pits have been sunk near Hales Owen, by Mr. Dawes, to the Thick coal seam, to the depth of 305 yards, which is now worked, or a part of it, 4 feet in thickness; these are south-east from the New Hawne pits; about two miles south-west of the same point pits have been sunk at Wassel Grove to the Thick coal seam, but the working of the coal has been discontinued, owing to its inferiority, and the admixture of batt along with it.

The New British Iron Company's works, at Brierley Hill, comprise 23 puddling-furnaces, 3 puddling-forges, and 3 rolling-mills, which produce about 200 tons of finished iron weekly. The Corngreaves iron works (exclusive of the mines) give employment to about 850 persons, and the Brierley Hill iron works to about 200 persons.

Jan. 18. —— A Mining Engineer.

THE SOUTH WALES COAL FIELDS.

NEATH RIVER—THE CLYNE AND BLAEN-Y-CWM COLLIERIES.

Sir,—Some two or three years ago I pointed out in your valuable Journal the desirability of making the Neath river a floating harbour, and showed it could be made a first-class place of refuge and security, where vessels would be protected from all winds; and any civil engineer looking at the plan can at one glance see that Nature has done all she possibly could to show us where large docks can be made with very small capital. Taking into account that Neath is as near as possible to the centre of the large South Wales coal fields, and that no less than from 3000 to 4000 tons per day passes (by and through the places where it could be loaded into vessels in this harbour) to Briton Ferry, Port Tennant, and Swansea, I have no hesitation in saying that it can be clearly shown that a dividend of from 8½ to 10 per cent. would be paid upon a capital of 500,000*l.*, if judiciously spent upon this desirable spot; and the public cannot help observing, by passing through, that the hills on both sides of the river, for 2½ miles in length and 1½ mile in breadth, afford sufficient room for sidings, drops, factories, stores, and other requisites—it is a rare and good opportunity (nothing like it in England or Wales, where the black diamond, iron, and copper works so generally abound), for the London and North-Western Railway Company to have docks of their own, without being fettered, surrounded, and monopolised by other companies, only simply by purchasing and improving the Neath and Brecon Railway and the Old Neath Canal. It is a great pity but what some good man, like the venerable Marquis of Bute, or the good and generous Mr. Vivian, who has passed from amongst us, would take this matter up, that their works—though dead, yet speaketh—might assist in obtaining means for developing and improving this great and important district, and the greatest desideratum at present needed. I am pleased to inform you that since my last communication to you some of our colliery proprietors have taken the hint, and are shipping in the present Neath river. Formerly the Dynevor Coal Company took their coal by canal and railway to Swansea, but since the property has passed into other hands (Messrs. Evans and Bevan, of the Vale of Neath Brewery), after reading the correspondence in the *Mining Journal*, they have commenced shipping in the river, and have made large drops and communication with the same, at the saving of at least 1s. per ton by taking it to Port Tennant and Swansea. No better proof can be required than that an old inhabitant and capitalist of the place has taken the matter up in such spirit and energy. I have observed no less than fourteen vessels at a time waiting for their cargoes, and, provided there was sufficient accommodation, it stands to reason that no firms like the Dowlais Iron Company and the Aberdare Colliery proprietors would send their coal through Neath at 1s. per ton extra, and where there is not half sufficient accommodation, and their trucks and rolling-stock are for a fortnight or three weeks at a time adding thereto very often another shilling per ton or more, which could be saved providing this river was floated up, and accommodation made.

I beg, also, to inform you that there are other further important improvements going on in the neighbourhood—viz., Messrs. Bidder, Newman and Newman, Moore, Moore, and Co. are making inclines and railways, 2 ft. 8 in. gauge, from Bryncoch, two or three miles long, and pits are being sunk near the old picturesque abbey, which gives it a beautiful appearance, and I wish them great success in their great undertaking. There is, also, the Old Neath Abbey Company, under the judicious and good management of Mr. Bell, sinking large shafts, near the Duffryn House, to the lower measures, all of which will ship their coal into the Neath river—and all these firms are alive to the most economical place of shipment. Immense fortunes have been made by shipping into this shallow river. What would it be provided the river were floated up, and vessels could be afloat in perfect security in all winds and weather? I may mention that there are collieries higher up in the Vale, about four miles above Neath river—I believe they are called the Neath Merthyr Steam Colliery Company (Limited). Notwithstanding they have had their difficulties, like other companies, to contend with, they have at last purchased the railways that were locked up in Chancery, paid for, and completed them from the Vale of Neath Railway up to the Clyne Colliery, where they have a good stationary engine, with two large boilers, which brings their trucks direct from the Great Western Railway to the colliery. From thence they have adopted the economical principle, like the Neath Abbey Company, and have made a small tram or rail way, 2 ft. 8 in. gauge, and laid with rails, 42 lbs. to the yard, to Blaen-y-cwm, a distance of three miles. A locomotive engine has been ordered by the company, to work from Blaen-y-Cwm to Clyne Colliery. I herewith beg to annex the report upon the two collieries:—

A Report of the Present Condition and Prospects of the Clyne and Blaen-y-Cwm Collieries and Works, situate near Neath, in the county of Glamorgan. By Joshua Richardson, M. Inst. C.E., F.G.S., &c.

Neath, Dec. 23, 1869.—According to instructions I had the pleasure to receive from Mr. Bedford, I have inspected the Clyne and Blaen-y-Cwm Collieries, and now beg leave to report to you the results of my investigations, so far as concerns the special object of your enquiry. Mr. Bedford informs me that you do not wish for an elaborate report, but merely an opinion based on the existing state of the collieries, railway, and works, as to the probability of the concern being a safe and remunerative investment for additional capital. It will, however, be satisfactory to you if I first give a brief description of the collieries and works, and then submit to your consideration the conclusions I have deduced

from the premises. Both the collieries are now opened, and the veins of coal have been sufficiently proved to enable anyone conversant with this coal field to obtain certain and accurate knowledge of the mineral resources of the property, so far as those veins are concerned. My inspection of the Clyne Colliery was satisfactory. I found the measures to be very regular, without any indications of faults or other disturbances, and the coal of its full thickness of 4 ft., with a parting in the middle, varying from 2 in. to 12 in. in thickness. The roof and floor are remarkably good, and little timber is required for props. A level heading has been driven in from the surface 253 yards, about 200 yards of which is through the coal. A cross heading of 110 yards has been driven to the rise, and everything is prepared for the immediate production of coal for sale as soon as the means for its conveyance to market are completed. The heading and other works in the colliery have been well and creditably designed, and have been executed in a good and workmanlike manner. The quality of the coal is quite equal to the best I have seen worked from this vein in the locality. In all cases it has proved more or less soft or friable. So far as I could judge, the coal wrought in the narrow heading, and, therefore, under disadvantageous circumstances, yielded fully one-half large coal, which is about the average of bituminous coal in the district. The Blaen-y-Cwm level has been driven in 150 yards from the surface, and has also proved the vein to be of its full thickness—2 ft. 8 in. Near the entrance of the level a roll of the measures was encountered, without, however, causing much inconvenience, or materially affecting the general soundness of the surrounding strata. Here, also, the roof and floor are very good. The coal cuts very nearly all large, the small being so inconsiderable as not to be worth conveying to the surface. In all my long experience I have never witnessed a similar circumstance. The workings in this colliery have also been well designed and executed, and are in a condition for immediate operation in producing coal for the market. I have rarely inspected collieries in which the coal can be more cheaply produced, or in which, under skilful management, a large quantity of coal may be opened and worked in less time than will be required in both of these instances. This is an important consideration in this case, as the fixed expenses of the railway will be the same whether the tonnage upon it be great or small, and, if the latter, these expenses may absorb all the profits on the coal. It is, therefore, most important to the success of the concern that a maximum quantity of coal should be produced, and this will be regulated as much by the capability of the railway as by the production of the coal. Taking all these matters into account, and after mature consideration, I feel no hesitation in stating that if these works are conducted with ordinary good management and professional skill, I have no doubt but that they will be a good and profitable investment, provided the capital already embarked in it is not excessive. Assuming the minimum produce to be 200 tons per day, which is only one-half of the capabilities of the two collieries, and taking the net profit at only 1s. per ton, although I believe it will ultimately be proved to be only two-thirds of the profits actually realised, it gives 3000*l.* per annum. As there is always at the commencement of such concerns considerable expense and numerous interruptions to a regular trade, which takes some time to establish, you must not confidently anticipate even the moderate profits I have assumed until after the lapse of the second or third year, which will depend on the ability and energy of your agents; but, supposing them to be equal to the efficient discharge of their duties, I can scarcely entertain a doubt as to the ultimate success of these collieries.

BOILER EXPLOSIONS.

SIR,—The frequent disasters occurring from steam-boiler explosions are attributable in many instances to ignorance of the original cause, or may be traced to culpable neglect. An erroneous notion generally prevails, which ascribes to the expansive pressure of steam the motive agency that works the engine; whereas the phenomena indicate that electric action supplies the amazing power developed, and constitutes the gigantic strength displayed, steam forming only a medium. The nature of steam and the condensing process exhibit conditions essentially distinct from explosive force, and produce different effects. Furnace fires heating water confined in boilers to high degrees of intensity evolve electric fluid in large quantities, and generate vapour charged with inflammable gas, elements combining vast energy with formidable ingredients, which demand the exercise of expert management and scientific skill safely to regulate, guide, and control, through the instrumentality of mechanical contrivances. The fact has been ascertained, by means of several experiments, that cold water, particularly at a temperature in frost ranging under zero, suddenly conveyed into immediate contact with caloric, imparts an electric shock, in some respects analogous to lightning, and bursts like a bombshell, projecting fragments of resisting materials in various directions to considerable distances. When waters runs low in the boilers inflammable gas accumulates in the vacant space, and, the iron plates becoming red-hot, explosions often ensue with similar results. In order to obviate the risks and remedy the dangers arising from these sources, the necessary precautions require the simple care of feeding the boilers with warm instead of cold water, and keeping them constantly replenished, expedients that will prove on trial adapted to prevent fearful catastrophes of the kind involving destruction of property and loss of life. It may be found useful to observe that the directions prescribed extend to apparatus employed for cooking purposes, and the same system can be pursued with benefit on a small scale in domestic economy, or more extensively with regard to public institutions. M. J. K.

PREVENTION OF COLLIERY EXPLOSIONS.

SIR,—At the present season, when so many are enjoying the good things of this life, perhaps it may not be out of place to call attention to the peculiar exigencies of those to whom we are indebted for the two essentials (gas and coal), warmth and light, so necessary to the comfort of our hearths and homes. The fearful sacrifice of human life from explosions in collieries, particularly within the last few years, is, I hope, a sufficient cause for my addressing you upon the present occasion, and calls loudly for immediate action, the more especially when we have an effectual remedy at hand, and in a country abounding above all others with wealth, and only requires to be made known to the affluent and benevolent.

I am acquainted with an intelligent working man who, after many years of intense study of the laws governing gaseous bodies, has discovered, beyond the possibility of doubt, a practical method of effectually ventilating collieries. He has, at considerable expense to himself, made working models which admirably illustrate his system, and which he has been induced to lay before the Government Inspectors of Mines, who has been desired by Mr. Secretary Bruce to report upon the same; but the difficulty the inventor has to contend with is the means to enable him to proceed to the North of England to lay the matter before the Inspector; he, therefore, throws himself upon the benevolence of those who are interested in developing forthwith so desirable an object.

The inventor will feel great pleasure in showing the result of his labours, and giving every possible explanation to those who may grant him a personal interview, relying with confidence on being able to demonstrate to their entire satisfaction the practical ability of the system, and that in giving their pecuniary assistance, which will be comparatively insignificant to the enormous benefits to be derived, they will be rendering the truest benevolence to a very large class of our fellow-creatures, and relieving the nation from being called upon incessently to provide for the pressing necessities of those rendered destitute by colliery explosions. I shall be personally happy to vouch for the accuracy of the foregoing statements. N. A. KELLY.

20, *Jermyn-street, Jan.* 14.

COLLIERY EXPLOSIONS.

SIR,—The precautions hitherto adopted to prevent the explosion of fire-damp have failed to achieve the purposes desired, and the constant recurrence of sad catastrophes, arising from this cause, clearly demonstrates the necessity of providing more effectual remedies. With this object in view, expedients are suggested, which may at first appear visionary and chimerical, but when attentively examined, and tested by experiment, will be found scientifically correct, and practically applicable:—enlisting the auxiliary aid of steam and gas conjoined in the affair, a design that presents the advantage of being accomplished with facility at moderate cost.

The agency of steam, substituted for the defective system of ventilation generally employed, furnishes a medium peculiarly adapted to prepare the condition of coal mines for illuminating with gas. The introduction of steam in pits, generated by the ordinary methods, supplies a fresh element composed of antagonistic qualities, which pervading the several quarters, expels inflammable ingredients and forces an escape through the shafts. This apparently simple vapour evinces like capabilities in extinguishing fire, and tried instead of water, proves remarkably effective in saving property without damaging perishable articles. The process of manufacturing gas can be conducted cheaply with the requisite apparatus at convenient spots, demanding merely the degree of ingenuity and skill usually exercised in projects of the kind.

The laying and fixing of the pipes, in proper positions and at regulated distances, along the different chambers, forms an undertaking that involves little difficulty in the execution. The process of igniting the gas, almost instantly, throughout the whole concern can be managed without personal danger, by the means of a voltaic battery and conducting wires, with platina points attached to each burner, in order to emit the sparks, a contrivance which will also serve to detect the existence of fire-damp and indicate the locality affected. The flame must be carefully protected by safety-lamps, suitable in size and guarded from injury; being especially constructed, to obviate the chance of contact with the insidious enemy that surrounds the gauze wire covering. In consequence of the arrangements devised, a portion of the electricity with which the fire-damp is impregnated becomes gradually consumed by combustion, imparting brilliancy to the enclosed light, and, in this mode, its explosive properties are absorbed without risk. The additional heat tends to promote ventilation and purifies the atmosphere from noxious substances. The diffusion of adequate light in places obscured by darkness will afford increased security to the workmen engaged in these perilous occupations, and facilitate the laborious task of conducting subterranean operations.

Should the success of the enterprise correspond with the anticipations indulged, and the interesting problem receive a satisfactory solution, an important branch of industry will acquire a new stimulus, attended with invaluable benefits to humanity, in diminishing the casualties incidental to pursuits peculiarly hazardous, and often deplorably fatal. M. J. K.

ON THE FORMATION OF VEINS.

SIR,—The report on mineral veins by Mr. Charles Moore, F.G.S., at the meeting at Exeter, is most interesting to those who pay attention to the subject, and it is certainly a study which should and must attract all engaged in mining, in order that we may secure data and rules, if I may use a plain term, in preference to theories, by which we may be guided, not only in the choice, but in the actual working of mineral veins. As regards the theory of the igneous formation of veins, or veins of vapours proceeding from the interior of the globe, I think it is time that that theory were exploded. It appears to me to admit almost of a *reductio ad absurdum*. In Cornwall, it is distinctly proved that many mines producing copper near the surface change into tin on entering into different strata or rock. It appears to be, in fact, the question of the day in that county, and in your Journal of Sept. 18, 1869, Mr. A. Bennett says that the remarks of "Metamorphose," in reference to this question, are geologically and practically sound; and on the strength of this very question it is proposed to work again certain copper mines in which it is stated that the change of rock takes place, and consequently a change from copper to tin. If the veins of metalliferous vapours were emitted from the centre of the globe, it would be necessary for the upper part of those vapours to have contained copper, and tin in the lower, in order to deposit them in conformity with the position in which they are found in Cornwall. Again, we do not find that mines which have produced tin change into copper in depth. The geologist will say that tin corresponds, or is always found in B rock, whilst copper is always in A rock; and that B being an older rock, it will always be found that where copper turns into tin A is overlying B. From this we are led to say that only certain minerals are found in certain rocks, and to lay down as a theory "that certain rocks only produce certain minerals." I use the word produce, because I wish to lead you on to the sequence that there is a decided affinity or marked relation between the contents of a vein and the adjoining strata, which it is desirable to prove or investigate.

In purely silver veins, in whatever formation, we also find a marked difference in the classes of ore found at the surface and in depth, although there is not any change in the formation—that is to say, that silver veins near the surface produce silver ores of one chemical composition, and in depth silver ores, but always of a different chemical composition. It may be said that though there is no change of rocks in the above case, there may be a variation in the quality or class of the formation or rock at the surface and in depth. In the silver mines in Chili we find in limestone, near the surface, what are called "metales calidos," of a simple chemical composition, which allows of their being easily beneficiated by the admixture of quicksilver only. In depth the ores produced are called "metales frios," which cannot be beneficiated by the Freiberg process, and consequently they are all shipped to Swansea for reduction by the lead smelting process. Is the difference in the change of the composition of the ores due to a difference in the limestone at surface and in depth, or to a change in the vapours, supposing the latter theory to be correct? Again, in the porphyry at Real del Monte the surface ores are called "rebeldes," because they are difficult to beneficiate, whilst the ores from a depth are called "pinta azul" and "azogues," from their facility for reduction by the native process. There is no change in the rock either in this case to account for the difference of quality in the ore. The ores produced by the great bonanza, or bunch, from the deep workings of the famed Rosario Mine were beneficiated without difficulty, whilst those from the surface would not give up half their silver contents, and consequently the shares were offered for a mere song then, and the mine partially abandoned.

To what cause are we to attribute this great context between the silver ores in limestone and in porphyry? The ores from the deep mines at Guanaxuato are also known to be easily beneficiated, even those of only 4 marcs per monton. As I am giving general data, it is foreign to the question to state the exact chemical composition of all the different classes of "metales calidos" on the one hand, and the "metales rebeldes" on the other; the question, in my opinion, is rather whether it cannot be proved that certain rocks produce always certain distinct minerals, and that one is as the parent to the child, or homogeneous. In Chili this fact is distinctly recognised by the native miners, who, when out prospecting, will point out and say that is "panino de plata, oro or cobre," as the hills in the vicinity may happen to be; they believe, therefore, in the relation that the rock bears to the metals produced by it. Unless, therefore, the igneous vapours were infused into the exact corresponding rock, there is no knowing what class of amaphrodite metal would have been the result, from the injection of the wrong igneous vapour into a limestone porphyry or granite.

There being no change in the chemical composition of gold, whether found at surface or in depth, and as in this its shows its nobility, to what are we to attribute the fact? If the igneous vapour system were correct, and gold could be found in indeterminate strata, it is clear that Sir R. Murchison could not, nor anyone else, have predicted the discovery of gold in Australia, which was found by the similarity of the "gold-bearing rock" there to that in California, and to the same cause, no doubt, the discovery at the Cape. The discovery of diamonds at the Cape and in Australia is also significant, as also their proximity to the gold-bearing strata and rocks, as well in those countries as in Brazil. In India gold seems to have been abundant formerly, but as a mineral country it is quite in the shade, with the exception of the Chanda coal fields, and the silver-lead brought to light by Mr. Henwood, almost in the snow range of the Himalayas; and we have an immense field of our own which does not yet yield us any data or profit. Will Sir R. Murchison, or some other scientific, furnish the public with data as to the geology of the celebrated Golconda, and, in fact, of India? as in view of such data, and that "certain rocks produce certain metals," we should induce, no doubt, great discoveries there. Leaving on one side the igneous vapours, we come to the question of the relation which minerals bear to the formation in which they are found, and how they were produced or deposited there.

The theory of Mr. Wallace I should prefer if stated thus—that veins in general have been filled by the circulation of water through the adjoining strata, into the fissures or veins, where the minerals were deposited by electrical and hydrous agency, since the formation of the fissure. I have no doubt that as geologists have discovered the relative age of rocks, so also will data be gradually forthcoming to prove the relative age of veins, and that the latter will be found in conformity with the relative age of the former.

In support of Mr. Moore's theory, I believe the present sea-water of the Chilian coast has been analysed by Mr. Field, and found to contain traces of silver, and calculations were made as to the silver contents of the sea, and we may, therefore, take it for granted that the ancient seas contained metals in solution, in order to found a theory on it. As regards the presence of organic remains, I can also state, in support of Mr. Moore's theory, that I have several specimens of different shells, taken from silver-lead veins at Acajuchitlan, to the east of Tulancuiga, in the Huasteca range of mountains. I am unable at present to say in what formation they are found, and doubt whether they are from regular fissure veins, as I hear they resemble the "mantos pintadores" of Chili, and that their dip does not vary very much from the horizontal. The mantos pintadores are found in the upper part of Chanarcillo, near Copiapo, and traverse the regular fissure veins, causing at the junction or intersection quantities of rich metal. In reading accounts of the riches of the White Pine Silver Mines of California, I find a great similarity between them and Chanarcillo, from the fact of both the districts having fissure veins, more or less perpendicular, which are traversed by horizontal silver-bearing strata or "mantos," and I should suppose that greater riches will also be found, as in Chili, at the points of intersection in the White Pines Mines. Both these mining districts are in mountain limestone, and the quality of the ores produced is very rich. Those from Chanarcillo are, as a rule, shipped from Copiapo to Swansea. In the above rock, amongst the rich classes of ore, is the ruby silver; and I would ask of Mr. Moore, if the sea holds it in solution why do we not find any traces of it in silver veins in porphyry? The difficulty I find in that gentleman's theory is the precipitation of the metals in conformity with the order in which they are found; this is the same difficulty as with the igneous vapour system, with the advantage in favour of Mr. Moore's that there are data to show the presence of minerals in the sea, which are wanting in the other case. I contend that there is a distinct relation between the contents of a vein and the nature of the adjoining rock, both of which it is necessary to analyse, study, and define, in order to arrive at a conclusion.

Granting that all minerals are held in solution in the sea, there must have been an affinity between certain rocks for the particular corresponding mineral held in solution, to cause its precipitation in the fissure vein; and the percolation of the sea through the body of the rock, supposing that the latter do no hold the minerals, would, however, extract from it the different matrices found in the vein. Supposing that the affinity of the rock for its corresponding metal was not sufficient to cause its deposition, this may very easily have been effected by electrical agency. I grant that mineral veins were at first fissures, but if the minerals in them were only deposited by the sea, then no mineral vein has been formed since the upheaval of metalliferous rocks above the sea-level, and the question of the age of a vein is to a certain extent determined. Fissures formed subsequently will, therefore, be in the nature of cross-courses—non-metalliferous. In the same manner as limestone in Chili, Peru, Sonora, Chihuahua, and California produces, comparatively with porphyry, a limited amount of rich ores, it is remarkable that the latter produces poor but abundant ores, and that depth is required in the latter, whilst I have seen in Chili, not unfrequently on the croppings of the veins, native and leaf silver in abundance. From the reports of Mr. Chalmers, of the Imperial Silver Quarries, California, where he is driving a tunnel in porphyry, I gather statements which confirm my opinion respecting veins of silver in that rock. The riches of the great Rosario Mine, of the Real del Monte Company, have lasted over 16 years, but the average ley has not exceeded 128 ozs. per 3000 lbs., so that they would not pay to export, whilst the Chilian silver ores are nearly all shipped to England. On the south coast of Peru and the North of Chili, which are separated by the Desert of Atacama, it may be said never to rain, and this has caused the preservation of the guano deposits, and the probability is, therefore, in this case in favour of Mr. Moore's theory that the minerals were deposited while the rock was submerged, as there is little chance of the fissures having been filled by the percolation of rain-water through the rock into the fissure, and so segregating the minerals contained and depositing them there. In order to establish Mr. Moore's theory it will be necessary, granting that the sea contains all the minerals, to show how certain minerals were deposited in certain rocks, and not indiscriminately. If it can be proved that there is an affinity between any given rock and the metal now found in it, the deposition of it when in solution in the sea may have been caused by electricity. Limespar, felspar, quartz, &c., are considered the matrices of silver, and the more matrices a vein has the greater probabilities of its richness. When these matrices are found in the veins, it is, no doubt, because the adjoining rock contains them, and I infer that the minerals may also be derived from the same source, from which they have been segregated by the percolation of the sea-water. I candidly admit, however, that Mr. Moore's theory has certainly the advantage, at all events *prima facia*, from the sea containing all the minerals in solution. As Capt. Absalom Francis says, after writing about junctions, I am not going to argue the point; in fact, I am too far away, but my brother, Mr. Henry Sewell, of the Freiberg Mining College, who holds similar views, and is now in England, may elucidate many points, and produce further data.

Having discussed the question of the formation of the mineral in the vein, I will later on write on the formation of veins, their run, and underlie, and also with respect to junctions, if the subject and its treatment be considered of sufficient interest to encroach on your space.—*Real del Monte, Nov.* 15. JOHN P. SEWELL.

THE ADVERTISING PRICE SYSTEM.

SIR,—The advertisement under this heading in last week's *Mining Journal* has naturally created much surprise, and since its appearance scarcely less surprise that in these days of applications to the Lord Mayor somebody or other has not apologised, or been remanded, or something of that sort. What are we to believe—that 'A Sufferer" is right, and that those he condemns so strongly are wrong; or that "A Sufferer" is himself "a snare, a delusion, and a lie?" It is not pleasant to mix one's self up in a controvery in which such language is employed; and it would not be easy to bring one's self to sympathise with "A Sufferer," who appears to have deserved all that he has suffered, for instead of putting his interests into the hands of those who have deceived him, he might have committed them to the non-advertising class. I take part in the controversy, that the public may be assisted in their judgment on the present system of investment in mining property, which in many respects is objectionable, and, besides, is responsible for much of the discredit that attaches to mining property. Purge and reform the system, I say, and get the public to understand that mining property is as safe as other property, and mining brokers as honourable and responsible men as stockbrokers.

In some cases, doubtless, those advertising have the shares they mention, or at least a portion of them, but perhaps in nine out of ten cases they have not; the object, therefore, of the false advertisements is to induce persons to enter into a correspondence with the advertiser, and to take the business which fairly belongs to the mining agent of experience and standing. If a sharedealer of position and capital were to carry out the advertising system in a legitimate manner, the public *might* gain an advantage, but at present none of the more responsible mining sharedealers, *under any circumstance whatever*, advertise a share at a fixed price. Some persons who advertise themselves as sharedealers, at the head of a list representing stock worth (according to their own prices) many thousands of pounds, are in reality men of straw, and are not in a position to supply a single share they advertise. On receiving an order for a share, they go to the market, and if they can buy it at a less price than they are offered, they supply it, and pocket the difference; if not, they write that the share has been previously sold or withdrawn. This system of advertising is not countenanced by the Mining Exchange.

I have had great experience in the mining market, perhaps more than most mining men, and consider the public would be better served by sending their business to a sharedealer to be transacted in the usual manner than by buying or attempting to buy the shares they see advertised. As a guarantee of good faith, besides a dislike to anonymous communications, I should place my name to this letter; but, as I am a London sharedealer, and not one who advertises shares, I fear by so doing I should appear to be blowing my own trumpet, and taking an undue advantage of the space which you are always ready to place at my disposal for legitimate purposes. I enclose my name and business address.—*London, Jan.* 20. SHAREDEALER.

IMPRESSIONS ON A RECENT VISIT TO THE VAN MINE.

SIR,—When I last visited this district I had orders for inspecting several mines, but not knowing the rules established for visiting the above celebrated mine, I was forced to content myself with visiting the surface works, and the machinery for the concentration or dressing the ores, commencing with the ordinary Blake's Stone-Breaker, crushers, jigging-machines, buddles, and the German "Continuirte Setz Sieb," or continuous self-dressing jigger, introduced into this country by Mr. J. Renfry, formerly of the Vigra and Clogau Gold Mines, now of the Glasdir Gold Pyrites Mining Company, near Dolgelly, the best machine of its class that has been introduced into this country, in company with the Rittinger percussion tables, which I saw at work at Schemnitz, in Hungary, before my departure for Mexico in 1866. The new concentration works, built by Mr. Renfry at the Glasdir Mines, are well worthy of a visit. Capt. Williams has ordered six more of the German continuous jiggers from the patentee. I have to thank Mr. Williams, son of Capt. Williams, for his affability in taking me round the floors, and the special care he devoted in explaining everything to me, considering that I arrived on the mine without a letter of introduction, and a perfect stranger to him. Capt. Williams himself was underground at the time, and I was informed that without an order from London no person was allowed underground. I soon forgot my temporary disappointment, by the interest I took in the surface works. The acquaintance with the Van and its captain was reserved for a future and more propitious occasion. I was determined, on my return to London, to arm myself with an order. I applied to a friend, who informed me he could provide me, but to be sure to be punctual, as he wished to introduce me to a friend who would give me the order. I was not aware that my friend was intimately acquainted with Mr. G. Batters, until I found myself ascending the steps of an office in 76, Old Broad-street, and he announced to me who his friend was. I was not prepared on such a short notice to meet face to face the man who had the pluck and sagacity to pay 48,000*l.* cash for a lead mine. I was struck all of a heap, and in my perplexity took refuge in arranging my collar and cravat, smoothing my hair, and the like, before being ushered into his presence. But the moment I saw his benevolent expression and great affability, I was restored to my usual composure. I was going to say we had a long conversation, but we had a long chat. He kindly introduced me to the secretary of the Van, Mr. Lavington, who gave me an order, and I also received a special one from Mr. G. Batters, for Capt. Williams. I arrived at Llanidloes on Tuesday, the 4th instant, in order to be at the Van at 10 o'clock precisely on the Wednesday—visiting day. Mrs. Van has such

mber of visitors that crowd to her house, that she has announced a special to be seen and visited.

efore going underground Capt. Williams was kind enough to place the plans he mine before me, and took great interest in explaining them to me before cending into the bowels of this mine, and it has indeed great bowels, and I eve it will take some time to derange them, notwithstanding the black pill, the voracity of the present machinery, and the future, that is being gradu completed. Mrs. Van will be able to feed her present and coming offspring some years. This is my impression, gathered from a visit of four and a half rs underground. It has been to me one of the greatest treats I have ever , notwithstanding I have seen nearly everything that is to be seen in the of rich mines in the Old and New World. It is indeed worth the attention cientific men, as well as the practical miner, to visit this mine; both can de great information, especially as Mrs. Van has also received visits from the sex, as a comfortable way has been arranged by Capt. Williams, who is most te to the fair, of visiting the mine without danger or trouble. To scientific n the interest will be from the peculiar geological and topographical forma , proving, as in most instances is the case, and which has continually come re my notice, the fact that all veins are simply infiltrations of charged ers, with solutions of minerals, hard by or at a distance from the place or lity of solution, and carried often for miles to cleavages in rocks, called veins odes.

o the practical miner and the intrinsic searcher for tangible wealth, this mine rs also great instruction. I found Captain Williams not only a most intel nt man, but a shrewd calculator, never letting himself in for a slip of the gue or for a landslip, in the way of assertions not backed by sound data. impression is that this mine, without the man, would never have been what s, and what it is likely to be. I should certainly like to see twice the amount machinery for dressing ores that at present exists on the mine, otherwise my ression is that it is neither fair to the man, the mine, or the shareholders. not see many Vans as yet in the district. I trust that in my next visit I ll be able to continue giving you my impressions on this mine, its peculiar logy and topographical position, which give me the impression that this mine destined to last many years. HENRY SEWELL.

Tan-yr-allt Farm, St. Tutwall Road, Jan. 19.

[ADVERTISEMENT.]

VIRTUOUS LADY MINE.

IR,—I was much surprised to read the report upon this mine, which appeared last week's Journal, signed "Thomas Neill." I anticipated a far greater de ciation of the property, as the services of Mr. Neill were engaged through most intimate friends and supporters, who happen to be the mine's greatest emies. It must also be remembered that some parties have sold shares as a bear"—that is, they have disposed of shares when they possessed none, and, ng unable to supply as per their contracts, they are now groaning under that rmidable enemy, a writ, served not by me, but by some more lucky purchaser. will thus be seen at even a rapid glance that it would be very materially to ir interest to knock down the price of shares. I will briefly narrate the his ry of Mr. Neill's report:—During my stay in London one of our largest share lders, who has invested as much as 800*l.*, paid the mine a visit. He was orted underground by Capt. Horswill, and expressed himself highly gratified th his visit. It so happened, however, that before leaving Tavistock he ma ged to find his way into the "bears' den," who, you may depend upon it, did eir utmost to growl over the mine. They succeeded in introducing Mr. Thos. ill, and the result was that his services were engaged by the shareholder to pect the mine. Now, I have not the slightest wish to damage the reputation Mr. Thomas Neill, but I demand justice, and I say most openly that he has t proved himself competent to give an opinion upon this mine. I have not e least idea of the amount of the fee he received for his services; but I know s, that he only spent one half-hour underground, when it is impossible for y person to hurry through and take even a bird's-eye view of the workings, der several hours. I ask the word at large what is the value of such a re rt? I might add my positive conviction that he inspected the mine deter ined to see but very little, and that little under its very worst aspect; but ere is really no occasion for me to say anything upon this point. I have no me to take the whole of his report *seriatim*; but I think it will be a source of musement and gratification to many of your readers to refer to your last num r, and compare notes with our agents' report, Captains John Gifford and . Horswill, which I now enclose for insertion. It is not in my nature, how ver, to refrain from having a little say in the matter. Mr. Neill "could not e sufficient ore for the tributers to earn wages." Then he must have been ind, or othewise he does not know copper ore when he sees it. We will take e very first pitch set, to Stanton and his boy, at 12*s.* in 1*l.*, for one month. e man pluckily headed the list of tributers, and, when commencing, he had thing but a few spots of copper ore for a start—the result is that at the end the month he broke a very large pile of orey stuff, which it is calculated will eld some 7 tons of ore, worth 7*l.* per ton. For one month's work for one man d one boy 10*l.* was paid on account before Christmas, and yet "the men can t earn wages." He will get 20*l.* at least, giving us a good profit, and leaving fine productive stope. He is welcome for me to his 20*l.*, and I only wish it ere 200*l.* He is this very day raising his ore to grass, and the pitch will soon be t again at a reduced price. As for the other tributers some are doing even better. nd so Hawkes' stope "cannot go down, as the ground is taken away below for me fathoms:" this is utterly false, as the ground is solid underneath. Seeing , they say, believing—there stands the ground to speak for itself. "They have surface from 18 to 20 tons of ore, worth about 5*l.* per ton:" this is correct— e had about 100*l.* worth of ore at surface when Mr. Neill honoured us with a sit, and perhaps it is fortunate, as many mines now working have never been lucky as to be able to boast of even that small quantity. "Underground I hould think about 10 tons, quality not so good." Thank you; so ore assaying per cent. is not worth 5*l.* per ton. According to my rule of arithmetic, and e present standard, about 13*l.* per ton is the price; but perhaps Mr. Neill has are capital to invest, and is thinking of embarking in the smelting business, nd is just showing his future partners what a valuable adjunct he will be in e purchasing of and further knocking down of that quite sufficiently perse ted mineral known by the name of copper ore. The finish of the report is re arkably conclusive. Mr. Neill has "been in the neighbourhood for more than enty years, during which time the mine has been worked by three different arties, and good parcels of ore sold therefrom, but not sufficient to pay cost of orking." This is incorrect: first, the mine has never in the present century, efore this company took it in hand, been worked at all—it has only been played ith; but it may be remembered that one Capt. Williams, even in his playfulness, anaged to make a fortune out of it some twenty years since. Perhaps Mr. eill includes a party of mining gentlemen, mining agents, and London rokers, who took it in hand some ten years ago, when they half forked the ater, achieved the feat of losing their lift, and then abandoned the affair, imply because they had no money of their own, and no one else would believe nd assist them. These men, although they were once foolish enough to have aith, now run down the mine, and endeavour to appear very earnest in their dvice, talking loudly of their own poor burnt fingers. Poor creatures; what a istressing case! I suppose they will carry the scars to their graves.

With reference to the report of Capts. Gifford and Horswill, it will most likely e noticed that they remark the tributers are getting "good wages." This ould not seem to agree with my statement respecting the gains of the tributers, ut my assertions are quite correct. It is simply the words which they have sed, "good wages," which would apparently imply about 4*l.* per month; but f any reader has the least doubt of the veracity of my statements, I would re ommend the asking of our agents through a letter in the Journal, and no doubt hey will receive the desired information through it. There are six tribute itches at work, but the one lately occupied by Stanton will make seven, as it ill be set again as soon as the ore is removed. The pitch at 6*s.* 8*d.* in 1*l.* is Hawkes' stope up in the backs, but as the lode is desued for 5 fathoms this will e taken down on owners' account, at a cost of about 5*s.* per ton. With these ew remarks I leave the reports of two of the acknowledged most practical and onscientious mining men in England to the criticism of a discriminating ublic; and, again, most cordially solicit the visit of any person, practical or otherwise, who may desire to see the property. I wish it to be borne in mind that my predictions for great success have always referred to deeper workings, nd new points in cross-cutting to other lodes; however, in the old workings alone I venture to state from what I now see underground that by the end of February next we shall have 1000*l.* worth of copper ore ready for sale, and by that time I anticipate we shall cut the great south lode. It was entirely upon the strength of this great feature of the mine, and deeper prosecutions, that I consented to take an interest in the property, as I never believed in finding ore in the old workings, but I have been most agreeably disappointed, and assurdly I have confidence that in about six weeks time we shall cut such a lode as will cause a clamorous demand for the shares at 10*l.* each. There will be 30 fms. backs, and driving upon the course of the lode west we shall intersect the caunter lode—another very important feature. A great deal is said about my predic tion for 20,000*l.* profits by the end of the year. Do not make yourselves so ridi culous, a dividend cannot be expected before we have hardly put a pick in new ground, and started all our machinery, but allow me to inform you that with a real good mine it is within the range of possibility for us to even double that 20,000*l.* within the time; and as our machinery is all paid for, and we have a large cash balance in hand, I think we shall be very well able to show 1000*l.* in dividends in the course of April next, although your correspondent, Mr. Neill, does not see his way to it. Facts are stubborn things, and time worketh won ders.—5, *Abbey Mead, Tavistock, Jan.* 19. THOS. J. BARNARD.

VIRTUOUS LADY MINE.

Jan. 18.—The engine-shaft is cased and divided to bottom, lift fixed in cistern at the 17, and the sinking-lift, which is on the mine, will be dropped in the course of next week, when we shall immediately commence sinking in ground favourable for progress and mineral; this sinking will be continued unto such depth as may be thought advisable to get under the old workings and cross-cut to the parallel lodes, two of which are to the north of shaft, and underlying south, and two to the south, underlying north, which lodes from the underlie seen will intersect at or about the 50, where, judging from all indications seen in the shallow levels, great deposits of the ore will be met with. A cross-cut is being driven south from the Screen shaft towards the south lode, and which is expected to be met with in about 6 to 8 fms. driving. The ground in this cross-cut is highly mineralised, containing strings and branches of mundic and copper ore underlying towards the lode, and which, as seen in the adit level, driving east towards the cross-cut, is composed of splendid gossan, peach, prian, mundic, and red and black oxide of copper. In driving west from the Screen shaft (Henry Metherill's end) the lode is 6 ft. wide, of peach, mundic, and good work for copper ore, going back in whole ground, and with every indication for a great and speedy improvement. There are six pitches working, in which the men have to pay all costs, and which may be enumerated as:—A pitch in Buckland bottoms, west of whim-shaft, working at 12*s.* in the 1*l.*; this pitch is turning out large quantities of good ore, and will in all probability lead to great discoveries. A pitch east of Westminster steps working at 13*s.* 4*d.* in 1*l.* A pitch up the straits working at 13*s.* 4*d.* in 1*l.* A pitch west of Screen shaft, at 6*s.* 8*d.* in the 1*l.*, from which great quantities of rich ore are being raised. A pitch east of Garden shaft, at 13*s.* 4*d.* in 1*l.*; and a pitch west of Garden shaft, at 13*s.* 4*d.* in 1*l.* In all of which the men are getting good wages, and the pitches have much improved since the letting. The mine has been only in fork about six weeks, and it clearly shows that, whatever opinions may be circulated about its *poverty*, up to the present time the adventurers have good reasons to congratulate themselves, and in such extensive workings as yet remain to be examined it is thought, and *reasonably too*, that a great quantity of ore ground will be found that will let at highly remunerative prices to the men, and leave large profits for the adventurers. To conclude, taking into consideration the great quantity of ore ground already discovered in the sides and backs of the old workings, and the bottoms as yet remaining untouched, being buried over by attle of former operations, there is not the slightest doubt when these workings are cleared that further and great discoveries will be made; and independant of our reserves in the present shallow workings, the deeper development of the mine will lead to *immense* riches.—J. GIFFORD, H. HORSWILL.

VIRTUOUS LADY MINE.

SIR,—In the Supplement to last week's Journal appears a report on this mine by Capt. T. Neill. Now, as this report was made for *me*, and is, therefore, *my property*, I regard the insertion of it without my sanction and without my knowledge as an unwarrantable liberty. The commission of this ungentlemanly act can only be accounted for by the hypotheses of the existence of a strong *animus* in the minds of the perpetrator against some of the parties interested in the mine. We all know that everywhere are to be found local jealousies and rival interests, but these should never be allowed, at least in their public aspects, to overstep the limits of gentlemanly feeling.

Contemporaneous with the inspection of the mine of which the report alluded to was the result, I thoroughly examined the property myself, and it was merely the curiosity to look at the mine from two different points of view that induced me to give Capt. Neill (a complete stranger to myself) the commission to inspect it—that gentleman having been recommended to me by a local party, decidedly hostile to the promoters. In fact, this course (with which the public had nothing whatever to do) enabled me, for my own private satisfaction, to compare the estimate of a party hostile to the undertaking with the views of its enthusiastic promoters, and also with my own convictions after a searching examination of the property with my own eyes at surface and underground. Having made this comparison, I came to my own conclusion. What that conclusion was may be inferred from this:—I had a large interest in the property at the time; *this interest I still hold.*

Respecting the "report" itself, one observation is sufficient to characterise the tone of it. Respecting the different tribute-pitches, Capt. Neill says "he could not see enough copper ore for the men to earn wages." There may, perhaps, be some of your readers who do not know that the men called "tributers" do not receive regular fixed wages, but a certain proportion from the profits of the ore they find—in the present instance, 13*s.* in 1*l.* Now, is it not singular that, according to the "report," these poor men come of their own accord to work week after week in a mine where they cannot earn a subsistence? I myself saw these men at work, and they certainly seemed well pleased with the results of their labour.

The mine itself, I consider, is more to be valued for what it *indicates* than for what it has actually within view. It is *beyond all question* that tens of thousands of tons of copper ore must have been extracted by former workers. It would be the height of folly to suppose that the immense excavations would have been made, and at a most enormous expense, without corresponding returns. And yet these workings have never exceeded 17 fms. in depth. What, therefore, may not be expected, with all reason and with all impartiality, at deeper levels? The masses of ore formerly extracted *must* have been thrown up from, and *must have* connection with, still larger masses beneath. But there is still a considerable quantity of ore remaining at the present levels; and this ore is of unusually rich quality—especially on account of the large proportion of silver found in it. Whether it would pay to extract this silver on the mine is a matter of opinion—at any rate for the present; but, of course, the smelters will have their eye on it, and the value of the ore be proportionably enhanced. In fact, of the extraordinary richness of the ore there can be no question, and anyone at all sceptical on the point can have his doubts at once dispelled by looking in at the office (Mr. Crofts'), 1, Finch-lane, Cornhill, where there is a rock of 5 cwts. broken out from one of the lodes. (When I was at the mine the ground at this point was strewn with similar large blocks, of precisely the same quality from the lode, which was opening out broad and full to the eye). If on sinking deeper—they are now down only a pin-scratch, as it were—they discover large deposits of ore of a similar quality (and there seems to me to be every indication in that direction), Mr. Barnard will prove to have been not far wrong when he asserted that the Virtuous Lady would be the richest copper mine yet opened up in England. Again, from another point of view, there is everything in favour of the mine; no expensive steam machinery required, with its costly and insatiable demand for fuel; no timber; and they have a command of water-power sufficient for half-a-dozen mines; last, and not least, *no calls.*

In conclusion, since I have taken the pen in hand, I would say a word to my fellow-shareholders. Do not be uneasy at the advertisement of a few shares from two or three parties for sale. I *know*, from the large holdings of certain proprietors—myself in the number—that these shares are really very few. As some proof of this, I may mention that I am at the present time suing a certain agency of London for non-delivery of shares contracted for in November last. There are always, in every commercial undertaking, certain parties who buy on speculation merely to sell again, for the realisation of a small profit; but it is the *legitimate holders* who will reap the real reward. Do not suffer yourselves to be persuaded to part with your interest for the advantage of others. Do not heed the specious warnings (*so* disinterested!) of the "bears." Remember East Lovell. Through the maleficent activity of certain parties the market price of this mine oscillated for a few weeks within a margin of 45,000*l.*, and the mine is now looking as well as ever—the richest tin mine (for its size) in Cornwall. I have myself also an interest in East Lovell; I have not parted with it, nor have I any intention of doing so.

Finally, I would say—Weigh carefully and impartially the arguments above advanced. It is my earnest conviction that those who adhere to the fortunes of the Virtuous Lady will soon have ample cause for congratulation.

IMPARTIAL.

P.S.—I enclose my card, and shall be happy to reply to any communication in reference to the mine, if you will kindly furnish my address for any private correspondent. I forgot to say that I have not the pleasure of the acquaintance of the "promoters," being completely a stranger to them, and they to me.

[For remainder of Original Correspondence, see this day's Journal.]

FOREIGN MINING AND METALLURGY.

The coal trade continues extremely active in the French basins of the Nord and the Pas-de-Calais, and stocks have been almost exhausted by the great activity which has prevailed since the commencement of winter. The activity which prevails at the workings is, in fact, only limited by a want of trucks, and this activity does not appear either to be drawing to a close, as 1869 ended with a good current of affairs, and numerous orders on Parisian account to be executed in 1870. Parisian industry is, indeed, suffering from inadequate supplies of coal, and it is complained that the French railway companies, like the Belgian, do not put upon their lines sufficient supplies of rolling stock. The Northern of France Railway Company has been especially singled out for attack for its alleged sluggishness in this regard. Nevertheless, not only does the coal of the Nord and the Pas-de-Calais arrive in considerable quantities upon the Parisian market, but rather important deliveries have also been made from Mons and Charleroi, although Charleroi coal is, for some reason or other, classed in the second rank in regard to supplies received for the French Imperial Navy.

The state of the iron trade in the Champagne district remains about the same. Prices are maintained, but orders arrive at the works less freely and abundantly than they did six weeks since; notwithstanding, however, this comparative quietness in affairs, the forges are still actively occupied in working up orders which had fallen into arrear; there is nothing surprising, after all, in the check which has taken place in affairs, and it might, indeed, to be expected, as stock-taking always paralyses transactions, and what has happened in January, 1870, may be said to occur ordinarily at this period of the year. There is this encouraging difference, however, in the present situation—that the general state of the metallurgical markets remains favourable, and that a good season is anticipated for the iron trade, unless some grave political event should present itself as an obstacle. The price of iron remains without variation, but is supported with firmness. Rolled iron from charcoal-made pig, first quality, makes 9*l.* 4*s.* to 9*l.* 8*s.* per ton; second quality ditto, 8*l.* 16*s.* to 9*l.* per ton; mixed ditto, first quality, 8*l.* 16*s.* to 9*l.* per ton; second quality ditto, 8*l.* 12*s.* per ton; coke-made ditto, 8*l.* to 8*l.* 4*s.* per ton. There are but few orders on hand for hammered iron; axles are still disposed of, but not altogether without difficulty. Machine iron appears privileged, its good tone becomes more and more decided, and numerous contracts are concluded almost daily. The works devoting themselves to the production of this description of iron maintain the following quotations:—Puddled charcoal-made, 10*l.* 4*s.* to 10*l.* 8*s.*; mixed ditto, 9*l.* 8*s.* to 9*l.* 12*s.*; coke-made ditto, 8*l.* 16*s.* per ton. Superior qualities of fine-grained iron and refined iron are also in considerable demand, and an advance of 4*s.* to 8*s.* per ton has been obtained upon the prices current in November. The foundries of the Champagne district do not want work; the production of pipes occupies most of them, with more or less activity, and has been resumed in all the foundries which had abandoned it. Rough pig seems a little neglected; and disposable charcoal-made refining pig-iron almost entirely makes default; mixed pig is held at 3*l.* 14*s.* to 3*l.* 16*s.* per ton. There is no change to note in the markets of the Nord, the Ardennes, the Meuse, the Moselle, and Paris; upon the whole, the state of those markets continues satisfactory. The Moselle Colliery Company has announced payment of its obligation interest, as has the Commentry Collieries Company, and the Fourchambault Montluçon, Torteron, and La Pique Forges and Foundries Company. The lowest price of the 20*l.* shares of J. F. Cail and Co. upon the Paris Bourse last year was 34*l.* 8*s.*; and the highest price was 37*l.* 8*s.* The lowest price of the 20*l.* shares of the Fives-Lille Company last year upon the Paris Bourse was 28*l.*, and the highest price was 34*l.* 16*s.* The shares of Petin, Gaudet, and Co. are also 20*l.* each; they attained their highest quotation last year in May, when they stood at 24*l.* 8*s.* each, but they had sunk in December to 11*l.* each. The 20*l.* shares of the concern known as the Chantiers et Ateliers de l'Océan fluctuated last year between 6*l.* 18*s.* each and 5*l.* each. Upon the whole, the success of French metallurgical companies would seem to have been far from universal.

The Belgian coal trade has been quiet, as it usually is at the commencement of a year. A mixed commission, composed of industrials and superior employees of the Belgian State Railways, has been appointed to consider the means best calculated to remedy the present scarcity of railway plant, and the different questions connected with transport industry. The commission has already commenced its meetings, at the Ministry of Public Works, at Brussels. The commission is composed as follows:—For Liége, Messrs. Charles Braconnier-de-Macar and L. Laporte; for Charleroi, MM. Goret and Bal; for the Centre, MM. Bourg and Gravez; for Mons, MM. Drion and Hardy; and for the Department of Public Works, MM. Vandersweep and Mongenast. The Belgian iron trade has scarcely yet completed stock-taking operations, and the circumstance, as is usually the case, renders affairs a little less active. The Produits-au-Flénue Collieries Company has declared a dividend of 2*l.* per share for 1869. The Courcelles Nord Collieries Company is paying interest for 1869, or 1*l.* per share. The Esperance Collieries, Blast Furnaces, and Rolling Mills Company will pay, on Feb. 1, as dividends for 1868-9, 16*s.* per preference share, and 4*s.* per new share. The United Collieries Company (Charleroi) is paying interest for 1869, or 12*s.* per share. The revenue of the Belgian General Company for Lighting and Heating by Gas continues to present a steady increase.

Copper has been a little firmer upon the French markets, but there cannot yet be said to have been any material advance in prices. At Havre, Chilian in bars has made 68*l.* 4*s.* to 68*l.* 12*s.*; refined, in ingots, 72*l.* to 72*l.* 8*s.*; and Peruvian mineral, 70*l.* to 70*l.* 10*s.* per ton. At Paris, Chilian in bars made 68*l.* 12*s.*; ditto, in ingots, 72*l.*; tough English, 71*l.* 4*s.*; and Corocoro mineral, pure copper, 71*l.* per ton. There is no change to note in the quotation of the article at Marseilles. The German markets have been quiet, and have presented comparatively few transactions. Tin has become somewhat more feeble at Paris, Banca being quoted 113*l.* 4*s.*; Straits delivered at Havre or Paris, 112*l.*; and English delivered at Havre or Rouen, 114*l.* per ton. The German tin markets have been feeble, and have displayed a slightly downward tendency. At Rotterdam tin has again fallen; some rather considerable transactious have taken place, but at rather reduced rates. Disposable Banca has been dealt in at 62½ fls. to 63 fls., and lots to be delivered in the spring at 62 fls. Billiton, which has been less offered, has brought about the same prices. There has not been much change to notice in lead. In Zinc there has been rather more animation, especially at Breslau. At Paris, Silesian to be delivered at Havre has made 20*l.* per ton, while other good marks to be delivered at Havre or Paris have brought 19*l.* 16*s.* to 20*l.* per ton.

FOREIGN MINES.

ST. JOHN DEL REY.—The directors have received the following, dated Morro Velho, Dec. 17:—Morro Velho produce for November, 12,090 oits., from 4041 tons of ore; yield, 2·991 oits. per ton.; Morro Velho cost for November, 4046*l.*; profit for ditto, 614*l.* Morro Velho produce, for ten days of December, 3162 oits.; yield, 2·505 oits. per ton. Gaia produce for November, ·603 oits., from 872 oits. tons of ore; yield, ·691 oits. per ton. Gaia cost for November, 512*l.*; Gaia loss for ditto, 255*l.* Gaia produce, 10 days of December, 206 oits., yield ·686 oits. per ton. New shafts cost November, 823*l.* Remittance, 30,171 oits., equal to 289·8 lb. troy.

DON PEDRO.—Mr. F. S. Symons reports for November:—Produce, 9571 oits., at 8*s.* 6*d.* per oit., 4067*l.*; cost, 2578*l.*; profit, 1489*l.* Our works have been pushed on as quickly as possible, considering the very heavy sick list. The high percentage of hands away from work has at times put us to great straits to man our pumps, and at the same time the other sections. The lode excavated has not been so good, and supply from bottom stopes affected by water. Stopes generally have yielded poor work; but from southern extremity of curve we were fortunate to meet some first-class ore sufficiently rich for boxes. Several tons of the reserves west of gully have been treated. In December, as tram-road in Bryant's cross-cut has been laid, we shall be enabled to obtain a large supply from this section.—First division of December—Extracts from letter, dated Dec. 17: Produce weighed to date, 4010 oits. Little alteration to note in bottom of mine; fissure is still having a bad effect on the "canoa" in underlie lode; we are sanguine this disturbance will be but temporary. I am pleased to report an improvement in No. 6 (new lode). Not only has the general body improved rising west, but in same direction we have cut a small line, which has already given about 700 oits., and after last taking was left with gold in sight. This is most encouraging.

ANGLO-BRAZILIAN.—Mr. F. S. Symons reports for November:—Produce, 3774 oits. (350 ozs. troy), at 9*s.*, 1698*l.*; cost, 1494*l.*; profits, 204*l.* Attendance has been fair; yield of stone, on the whole, encouraging, that from Dawson's particularly so, and the produce is in excess of that in October (with one working day less) by 382 oits. Little alteration has taken place in the appearance of the mine. The lode at Dawson's maintains its favourable size and auriferous properties. That from the Fundat as yet is not rich, but highly promising in aspect.—First division of December—Extract from letter, dated Dec. 17: Looking to many of the natives leaving for the Christmas holydays, and to get as much stone as possible for the stamps, I have allowed those who choose to do double duty in boring. Many of those leaving for districts were labourers can be picked up, I have promised a premium if on their return they bring with them new hands. Rarely has Passagem presented a finer scope for a large force, and I am doing all that lies in my power to attain it. Sick list is not unfavourable.

ROSSA GRANDE.—Mr. Ernest Hilcke reports for November:—"The produce for the month amounts to 2496 oits. (288 ozs. troy), at 8*s.* 6*d.*, 1060*l.*; cost, 1041*l.*; profit, 19*l.* In Mina de Serra I am much pleased to state that the general promising appearance of the lode, from the 56 fm. level downwards, has undergone very little alteration, and that in the end of this level continues of an average size, but in the stopes above the lode is becoming small, and seemingly has reached the eastern extremity of the shoot. At the 60, which is now in 8 fathoms from the shaft, we intersected the lode, but contrary to expectations, it is very small so far. The chief supply of stone for the stamps has been derived from the stope opened out below the 56, which proves to be highly auriferous; 201 tons have been treated, and gave an average percentage of 12·4 oits. per ton. In Gongo Mine, at the main exploration, I am sorry to say we have met with no improvement; the vein followed down on its underlie, in a northerly direction, has died out.—First Division of December—Extract from letter, dated Dec. 16: The works in the mine have been greatly hindered for want of force; the majority of our native labourers have gone to their homes, and there is little hope for their return until after the Christmas holidays. The lode in the 60 maintains its favourable feature, but that in the stopes below the 56 is somewhat decreasing, and at some points is becoming disordered by soft killas. Experience, however, has shown that these changes are only temporary. But these circumstances I fear will tell unfavourably on this month's produce, for although the whole force is employed in merely raising ore, yet at times there is want of stone for supplying the stamping mills sufficiently.

GENERAL BRAZILIAN.—Report for November: All circumstances considered as to smallness of force, irregularity in attendance, and unfavourable weather, fair progress has been made in surface works. Judicial possession of the company's property was taken on the 19th.

TAQUARIL.—Mr. T. S. Treloar reports for November: A cross-cut was commenced on the 16th from the bottom of the engine-shaft, and is being driven with all the means at our command towards the old mine—the deepest part of which is said to be only 40 fathoms from surface. The water in the former has abated very considerably since sinking operations were suspended, and should the ground in the cross-cut continue as dry and favourable for taking away as hitherto, we shall in all likelihood intersect the old workings some time in December.

ANGLO-ARGENTINE.—The directors have received the following advices from Mr. William Barnard, the company's superintendent: San Juan, Dec. 1: Capt. Vivian expresses himself much pleased with the appearance of the six miners who arrived at Gualilan on the 24th inst. Capt Goundry continues to advise good progress with the road.—From the London and River Plate Bank, Buenos Ayres, Dec. 15: The object of the present is to hand you enclosed bill of lading on No. 146, a parcel containing gold of the value of 140*l.*, received from Mr. William Barnard, of San Juan, and shipped by his instructions by the Royal Mail steamer Oneida to your address.—Shareholders wishing to see the gold by calling at the office will have a card given them to the company's bullion brokers, Messrs. Sharp and Wilkins, Great Winchester-street.

BRAGANZA (Gold).—W. H. Richards, Dec. 16: You will be glad to hear that we have commenced operations for exploring the mine, and have set the adit to drive at 26*s.* per fm., for 4 fms., when we expect to cut the lode in about a month; there are several small veins of quartz in the present end, in all of which traces of gold have been found. We have also commenced a new cross-cut about 8 fms. below the present excavation, at 10*s.* per fm., by which we expect to cut the lode in the level within about a month; we find traces of gold in all the samples taken away. We have also commenced on the course of some quartzose veins, which crop out at surface. The veins are very promising in appearance, and show gold in the batea; the price paid for driving this level is 10*s.* per fm.—Alluvial Deposit: We have washed some of the red earth which is found on the rock formation, and find it contains gold; the richer alluvial deposit will be found, of course, nearer the bottom of the mountain. We have commenced clearing the water-courses which convey the Cafua water to the mine, in the hope that it will be sufficient to enable us to commence hydraulic operations. I have increased the number of men during the last fortnight; amongst them are several practical miners; but in consequence of the rainy season of the year the roads are in a very bad state, and have occupied our time in repairing, also putting the partitions in order for the workmen, &c.

ECLIPSE (Gold).—By the Royal Mail steam packet (Seine) Capt. Barratt and staff left for the Eclipse Gold Mines, and are expected to arrive in California about the end of February. The requisite machinery is in course of construction, and will be dispatched in a few days, so that no time may be lost in commencing operations.

IMPERIAL SILVER QUARRIES.—L. Chalmers, Dec. 27: Eleven feet of tunnel were made last week.

NEW WILDBERG.—J. Sanders, Jan. 11: East Mine: The ground in the drivage east at the Erbstollen is composed of grauwacke, schiefer, quartz, and steelstone, with a slight mixture of lead ore, but not sufficient at present to set a value on.—Carter's Shaft: In the 70 lachter level the drivage and stope on the Erbtiefstergang Erzkammer are yielding 1¼ ton of ore per cubic lachter. We have also commenced to work in the bottom of the level, where the lode is worth 1¼ ton of ore per cubic lachter. The men working in the bottom of the level are removed from the Dornergang Erzkammer, where one of the stopes is suspended for a short time to get through the old workings to take up the water that is now going down to the deeper levels into the launders to bring it out through the adit, if possible. In the 60 lachter level the rise above the level towards Johanne's sink remains as last week, worth 1 ton of ore per lachter; and the stope, east of Michael's shaft, is also worth 1 ton of ore per lachter.—Dornergang Erzkammer: The different stopes above the 50 lachter level are yielding the usual quantity of ore—1 ton per lachter; and the pitch on the Gotteshülfe 1¼ ton per lachter.—Beck's Workings: The stope above the 60, west of the sink, is worth 1¼ ton of ore per lachter; the stope east of the sink is at present idle.—Blumengang: The stope above the 70 is worth 2 tons, and the stope above the 60 lachter level 1¼ ton per lachter.—West Blumengang: We hope to get the pumping-engine to work to-morrow and next week; if the weather will permit we intend commencing to fix the accumulator engine.

PESTARENA UNITED.—Thomas Roberts, Jan. 11: Since our last the weather has moderated, and the carriage of ore from Val Toppa been commenced, and the mills at this establishment have not as yet been started this month, owing to the great quantity of snow yet on the ground; the carriers have, however, commenced to bring ore from Crippimarelli rope station in small quantities to Battiglio with sleds. We hope shortly for better weather, and roads in a better state, so as to bring with greater speed the ore at the rope stations on to this establishment. Of the mills at Pestarena we are only able to work a small number, owing to the ice in the Anza. The several points in the mines continue to yield about the same proportion of gold as our last estimate. On surface we have made another start on the new watercourse. Hoping that no snow will trouble us any more this winter, as we have had a plenty for the time. From the woods to Pestarena we have a good supply of timber on the road.

[For remainder of Foreign Mines see to-day's Journal.]

The Royal School of Mines, Jermyn Street.

MR. WARINGTON SMYTH'S LECTURES.

[FROM NOTES BY OUR OWN REPORTER.]

LECTURE XVIII.—Having (said Mr. SMYTH) considered the implements employed in breaking down the rock before the use of powder in blasting was general—methods which even now are indispensable in some cases, and are employed rather than the uncontrollable force of gunpowder, which is apt to split up that which it is desirable should remain, and to produce hidden fissures, which afterwards let down the rock unexpectedly, and cause damage and loss of life. Thus, in shafts it is sometimes necessary in hard rock to cut niches in the side, in order to provide for catchings or footings to prevent the fall of the rods in case of fracture, by pretty strong beams athwart the shaft. The stability of these catches and beams are often indispensable for safety, and, therefore, it is not desirable to use gunpowder in cutting the ledges and heelholes, for it is of the highest importance that they should not be liable to crack away. Both in coal and metallic mining considerations of this kind often require very careful procedure indeed. The hammer and the chisel, therefore, in hard rocks can never be entirely dispensed with, although their use is more costly, and less effective as regards quantity, than that of gunpowder, fire-setting, or other expedients. The question, however, naturally arises, how is it that so vast a number of men are kept at work on so simple and mechanical an operation as that of cutting and breaking down the valueable minerals, or in piercing the rock to obtain access to them? It would seem at first sight that holing was an operation especially adapted for machinery, rather than for men, who have to lie for hours at a time on their sides, and in other difficult and fatiguing positions, chipping away bit by bit the lower coal, so as to bring down that which is above. Indeed, it was proposed long ago to employ machinery worked by steam, by compressed air, or hydraulic pressure. Twenty years since the late Mr. Peace, of Wigan, invented a machine, but his "iron man," as it was called, met with nothing but ridicule and contempt. Within the last six or eight years, however, this question has had much attention bestowed upon it; for both the coalowners and the public have had it forced upon them. If the owners of coal or other minerals are to be interrupted continually by strikes carrying away all the men from their work, it is obvious we are never safe of seeing ourselves deprived, not only of our supplies of that fuel which is so important for the domestic comfort of the whole country, and which in this climate is an absolute necessary of life, but that also which drives all our machinery, and gives life and vigour to all our manufactories and efforts of constructive and mechanical genius. The public, therefore, is looking with great interest on the experiments—for as yet they are only experiments—which are going on, and which have already displayed a great amount of ingenuity, coupled with much promise. Some are doing good work, but none have as yet been sufficiently proved as to become installed as a regular part of colliery appliances. It was hoped that, years ago, when a large premium was offered for a machine which would do the work best in a colliery, we should before this time have obtained what is so much wanted; but difficulties stood in the way, arising from jealousies of various kinds, and at present, although many machines have been called into existence, not one has yet proved itself capable of general application. Most of these inventions are made to imitate the action of the collier's pick. Strong arms, placed in a horizontal position, are made to act upon the coal with a simple and powerful movement. A full sized machine of this kind is now placed in the model-room, and you will see at a glance the principle on which it acts. The pick is made to strike backwards and forwards, very much as a man would wield it, but with this difference, that it cuts its way through all obstacles, and thus holes to a depth of 3 feet, and a length of many yards, in a short time. Thus, it will do as much in 20 minutes as a man would do in several hours, and there are other advantages; but there are difficulties arising from the changes which the material to be cut so often presents, and thus the arrangements of the machine require frequent alteration. In places where there is a secure roof, and in which, therefore, the machine has a firm hold or purchase, it will, no doubt, do excellent work. Another objection raised has been taken to the fact that if the coal should contain pyrites, or lumps of carbonate of iron, upon which the picks would strike fire, it would be extremely dangerous if there should be much fire-damp. I do not know whether it is asserted that any accident of this description has occurred, but there are, no doubt, two or three cutting or holing machines capable of doing good service. It would be unfair, in the present state of things, to mention names, but it is only by the results of actual trials and continued work in the mine, and not by experiments at the surface, that the merits of the one or the other are to be determined. There is another point highly worthy of notice. Any competent machine will be capable of keeping pace, not only with what the colliers can do, but go far in advance of them in speed, so that the machine would find abundance of employment for putters and hurriers, and enable the drawing power to be kept at work without delays and hindrances. Another great advantage would accrue from the use of machines, that there would be a far less amount of "smalls." At present the hewer, although he works on his side so as to make as little waste as possible, is obliged to cut away at the face, (say) 4 ft., which gradually diminishes as the depth of the cutting increases to ½ ft.; and all the coal taken out of this space is generally slack, whereas the hole, or cutting, made by a machine would not need to be of greater altitude at the opening, and may be uniformly not more than 6 or 8 in. high, if so much, a point which would depend upon the relative hardness, or softness, or brittleness of the coal. Another class of machines, which act by rotary screws, are highly spoken of, according to the experiments made on them. Another machine is worked by a long steel bar, forced forward by hydraulic pressure, and carrying on it a series of three gouging chissels, which cut off slice after slice of the face of the coal, and so prodnces the requisite holing. This is said to work remarkably well when it is fairly set going, but that it is very apt to get out of order, a circumstance that would naturally militate against its extensive application.

As regards machinery for cutting out bodily the whole material to be removed, I have very little to say, because I do not believe, from the results of all the experiments I have heard of, and the circumstances to be dealt with, that any machine yet brought out has any chance of success, except with material of such extreme softness as moist clay, or soft chalk, and not in the harder rocks in which mining operations are conducted. Two or three have been tried in this country, which were ushered in with a great blowing of trumpets, but which in the end have gone out with very little noise indeed. The disappointment they caused might have been anticipated, when it was considered that, acting upon hard quartz, the cutters would inevitably suffer severely, and the necessity of repairing them must occupy a great length of time. I can only cite one or two cases where, with what may be called dogged perseverance, they were kept at work long enough to cut out a few yards of ground. At Festiniog, for instance, where a machine of this kind was employed to drive a small tunnel or drift through a moderately soft rock, and in a year finished the work, making the tunnel quite circular, and smooth as the inside of a tube. In this case the cutters worked on a disc pressed against the face of the rock. It is a plan not likely, however, to succeed with hard rocks.

Very different is the use of machines for drilling bore-holes, in which it is intended to introduce some blasting material, which is an end reasonably to be expected will be attained by machinery with great success; we will, therefore, pass on to the subject of blasting and boring. Nothing is more surprising, considering how early gunpowder was invented and used for the purpose of piercing and shattering the bodies of men, that so great a length of time should have elapsed before its application to the purpose of blasting rocks in mining. The discovery of gunpowder for warlike purposes took place in 1354, but it was not introduced into mining until the last century. In a curious old book, published in 1700, entitled "Familiar Discourse Concerning the Mine Adventure," which amongst other things compares the use of gunpowder as a newly introduced system of blasting with the old method of wedging down the material in mines. Its use for mining purposes is suppposed to have been first proposed at Freiberg, by Martin Weigal, in 1613, but the idea met with little countenance, and it was not till 1631 that it began to be generally employed throughout Saxony, the Hartz, and North Germany. The practice was first adopted in England in 1670, at the Ecton Mines, in North Staffordshire, but the blasting at that time was but a clumsy process, and was used to blow in pieces masses of rock, which had already been freed from their beds by other agencies. We must not, however, be led astray by statements in books respecting the earlier use of gunpowder in mines, as the older references to "firing" belong to the still more ancient practice of "fire-setting," which dates from a very early period, and was, no doubt, employed by the Romans.

The introduction of gunpowder has been an immense boon to mining undertakings. It not only enables the miners to work upon rocks of great hardness at an economical rate, but it has led to the enlargement of such excavations as drifts and levels, and so placed the workmen in a better position as to ventilation, comfort, and health. Formerly the miners, when cutting the rock, were compelled, by the narrowness of the levels and smallness of the working places, to inhale the dust made by themselves in piercing the rock, and their lives were shortened in a frightful degree. The mines, since the use of gunpowder, have had to be arranged with greater regard for ventilation, and the cylindrical holes for the gunpowder are now often, while being bored, kept full of water, and the old injury to the breathing faculties are for the most part avoided. There are, of course, occasions and places where gunpowder could not, or ought not, to be used. Where, for instance, fire-damp is common, and it is necessary to use safety-lamps, the lighting of a fuse with an open match will be most dangerous. In many collieries a certain man is employed to fire the shots, whose duty it is to test the places beforehand, and see that no gases are present in quantities sufficient to take fire; but, as we all know, accidents do occur very often, and it is much to be desired that the practice should be greatly restricted, if not done away with altogether. Another case in which gunpowder should not be used is where the seam is much fractured and fissured naturally, so that a shot would result in so large a proportion of small coal as to make the working unremunerative. Again, its use is inadmissible in quarrying marble, or other stone, where it is an object to obtain the rock in large and perfect masses. The methods of employing gunpowder are, to a great extent, the same in principle in all the mining districts of the world. At first in this country, as elsewhere, boring the holes proved a slow and imperfect work, but, nevertheless, it soon came to be observed that by cutting away underneath, and then blowing the rock or seam down by gunpowder, one man could do as much as six with a hammer and gad alone. This, then, at starting renders it possible for a mine to be taken up and worked to profit which could not formerly have been done. The hole is bored, the powder placed in it, either loose or in a cartridge, it is then filled up, or "tamped," to the surface, and a fuse having been arranged, it is fired, and the result is that a portion of the rock is blown down. The hole is bored with what is called in different places a "jumper," a "drill," (Fr. pistolet), or an "auger"—a piece of iron with a sharp steel ending, called "a bit," which may be shaped in various forms, and then struck in the hole with considerable force and dexterity by the workman, until gradually a sufficient depth is pounded out. In most cases it is struck by a hammer wielded by the borer singlehanded, but sometimes one man holds the jumper, and turns it after every stroke, while two men strike alternate blows, and thus greatly accelerate the work. The larger augers are usually from 1⅛ in. to 2½ in. in diameter, and in Germany it has been proved by experiment smaller bits are not advisable. The material of which these borers are made has been a question of great importance. About eighteen years ago, the bar of the auger was almost always made of the best fibrous iron, the head being of steel, and the bit or edge of the best shear steel. In Derbyshire, however, they were accustomed to use cast-steel, which in the fluor-spars usual there, of very moderate hardness, did very well, and lasted so long that borers bequeathed their augers to their sons; a very different state of things from that of other districts, where an auger often would be worn out in a day. Cast-steel, however, has been substituted generally for iron; and that because it is not only more economical, but the blow given on the head of an auger of cast-steel is transmitted so much quicker to the edge, as to give it a decided advantage over iron augers with steel bits. It had long been observed that when the borers had worked for some time with the iron augers some change in the metal was produced, and the blow became more effective than at first. Since 1852 steel augers have, however, became general, in spite of their greater first cost. In a case in North Wales, where very accurate accounts were kept, it was found that the use of steel borers decreased the cost of working nearly 10 per cent. The form of the cutting edge varies a good deal. When the ground is moderately soft, the ordinary chisel-shaped edge prevails. In the Hartz it is often curvilinear. In Italy the borers have two edges at right angles, while in Mexico they are swallow tailed. In all cases, however, the borer must be turned after every blow through a small portion of the circle, so that the edge never falls upon exactly the same place. When the bottom of the hole is clogged with the debris produced by the cutter, the hole is filled with water, which washes out a good deal, and a scraper takes out what is left.

There are many circumstances under which it is necessary to put down holes of a larger character; and then the augers are made larger and longer, and the hammers to strike it heavier. Stages are erected in such instances, so that on each stage several men may be placed to raise the auger, and thus a dozen men may at the word of command all lift and let go together. A jumper of this kind may weigh from 2 to 3 cwts. In cases of this kind the spring pole may be used to advantage. This brings us to the question whether or not machinery may be employed for the purpose of boring, and whether it cannot be done at a less expenditure of human labour, and more rapidly. This problem has been practically solved on a large scale. Carl Schooman, an eminent machinist of Freiberg, has contrived an implement peculiarly suitable, and which is now worked most successfully at Mont Cenis by means of compressed air. Each machine (and there are eight or ten mounted over each other, and operating on the face of the rock) has a piston-rod prolonged into a borer. This is made to strike the rock (and is turned partly round at every stroke) a great number of times per minute, probably from 200 to 300. The effect upon the spectator who may be anxious to visit the working ends is terrific. The din of the eight or ten machines striking incessant blows, the outbursts of compressed air at high pressure, and all the other noises combined, made it impossible to hear the loudest efforts of the human voice. The machines, however, are a satisfactory specimen of mechanical art, and get through the work with great rapidity, as compared with boring by simple hand labour. The works are conducted on a large scale, and with an expenditure that can only be borne by a national exchequer or the resources of a rich railway company; but in the case of mines the managers have to economise, and no poor mine could afford to employ expensive machinery. Their chief aim is to get the greatest amount of work done for the most moderate amount of money, and thus up to this time there are but two or three machines practically available for boring holes. They have up to a certain point proved a success, and I, therefore, should wish to see them tried under the circumstances created by different depths, and varying degrees of hardness in the rocks. Amongst successful machines, that of M. Bergström, a Swedish engineer at Persberg, who has applied machines on the same principle as those at Mont Cenis, in the mines of Sweden, where the rocks are extremely hard, and has made progress at a rate utterly unattainable by the ordinary methods. M. Dœring has a machine employed with success in boring holes in the Vieille Montagne Mines; and at Altenberg, on the borders of Belgium and Prussia, where Max Braun has applied the same machines in driving through the hard dolomitic rocks with double the rapidity attainable by ordinary boring and blasting. M. Dœring has not been afraid to apply one of his machines in a very deep mine at Redruth, in Cornwall, called Tincroft, in which there is the hardest rock to be found in the country. At first this rock set the machine almost at defiance, being far harder than the granites shown M. Dœring as the hardest of Cornwall; but by modifying his machinery to meet the difficulty, he is now making good way through it. I am glad to find that another machine of Dœring's is about to be introduced at the Dolcoath Mine, so that we shall have an opportunity of seeing it work under varied circumstances.

LECTURE XIX.—In describing the methods principally employed for the purpose of boring holes for blasting, and the propositions made from time to time, and particularly during the last few years, to substitute machines for manual labour, of which I mentioned as successful examples those employed at the Mont Cenis Tunnel, which are remarkable for the saving effected, and the greater rapidity with which the work is done, and other inventions employed in mines, I might have mentioned several other machines. Indeed, their name now is "legion," and it is difficult to make a selection even from the best. An extremely ingenious process devised by a French engineer attracted much attention at the Exhibition at Paris. It did its work at the surface of the ground with remarkable efficiency, and is now at work at one of the slate quarries of North Wales. The drilling portion is a cylinder, on the extremity of which diamonds are mounted, the centre of the borer being open. The stones used are a sort of black diamond, and of small value compared with those brilliant stones used for personal adornment. The cylinder being put in rapid rotation by hydraulic pressure, is made by an ingenious contrivance to press with a regulated force upon the face of the rock. The effect is an annular cutting, the core of which passes through the centre opening of the tool, while a jet of water being driven into the hole, the dust and sand are all washed away, and the diamonds allowed to do their work without hindrance. When the diamonds are worn down too far to be serviceable, what is left is saleable to make diamond powder, and, on the whole, the expenditure is very small—indeed, something like 10 in. in depth being cut at a cost for diamonds of a penny.

The hole having been bored, the next part of the work is to introduce the charges. These in amount must be regulated by the nature and condition of the rock, and what is required to be done. Thus less powder will be required when the material is cavernous, or "vughy" as it is called, than when it is close and tough, and free from fissures. It frequently happens when the lode is completed it is more or less full of water, which in a wet district may find its way in from the sides, and thus evidence the existence of joints or fissures. It is necessary to get rid of this influx, which is done by what is called "claying." A little well-tempered clay is driven into the bore-hole with a bar of iron, which forces it against the sides, and thus fills up the joints and cracks. In this way the hole is prepared for the charge. It has been suggested that it would be a great advantage, theoretically and practically, if the lower end of the bore-hole could be enlarged so as to form a little chamber; but this is a somewhat difficult matter to accomplish. It has been attempted by pouring in sulphuric acid, and so dissolving the rock at the bottom sufficiently to enable the majority of the powder to be lodged there; but this sort of arrangement is very seldom adopted on account of the extra trouble. The powder used is of several different kinds, all of which have their advocates, without any decided evidence being given of advantage over the others. Ordinary blasting powder has a very coarse grain, and the miners generally prefer it to the new patent blasting powders; and in the absence of proper experiments carried out upon the same rock, and by the same hands, they are probably right. There is considerable difference of opinion whether the charge should be enclosed in a cartridge or loose. If the rock is a little fissured and dry, miners prefer the latter, as they say the powder goes into the fissures, and is more effective. If the hole is wet then properly prepared cartridges are best. These the miners frequently make themselves, but they may be bought ready made and fitted with fuses. It has also been suggested as an advantage that a little space should be left, so as to allow the expansion of the air in it to assist the effect to be produced, but all these are points which probably do not appreciably affect the result. The powder when loose is put in by a simple charger like a funnel, or a long-handled spoon, with great carefulness. In putting in charges, and particularly of rocks of a sharp character, having quartz in them, there is to be guarded against the danger of eliciting a spark by the use of iron, and thus causing a premature explosion. If the men are working in limestone rock there will be little or no danger in employing iron tools. The charge, however, being placed, the next thing is to put in the wad, which is usually composed of a little clay or soft paper, pushed down by means of a stick. An iron rammer should never be used. The accidents attendant upon blasting are numerous, but they are due chiefly to the carelessness of the men. It is at this stage when, by the use of iron tools, and the blowing out of the charge, so many miners lose their eyesight. A needle is then passed through the wad, and left in the hole until the latter is filled with the tamping. Too commonly the needle is of iron, and the tamping is done with iron tamping bars. If the hole be horizontal, some grains of powder are sure to be left, and then if the bar, being of iron, strikes some fragment which will give out a spark, a premature explosion takes place, which if it does not maim or kill the men, is almost sure to injure their sight. If the hole be vertical, the tamping may be effected by pouring in sand, which forms so efficacious a tamping that many persons hold that no other need be used. The sand must be free from moisture, or it will fly out like the charge from a gun, and so the explosion will be futile. In some way, the particles of sand being loose, the force of the explosion is delayed amongst them long enough to allow it to take effect below the sand, and thus to dislodge the mass sought to be removed. The best tamping, however, there is no doubt, is well tempered clay. Through this the tamping bar is hammered down to the charge in order to introduce the fuse, and if any gritty or quartzose particles come in its way, the charge is again almost sure to be prematurely ignited. It was proposed long ago by a benevolent physician of Cornwall, Dr. Paris, to tip the end of the tamping bar with bronze, which would give a perfect immunity from such accidents, but the little additional expense this involves frequently prevents the expedient from being adopted. The fuses used formerly were of the most simple kind—as, for instance, a stiff straw loaded with fine sporting powder was placed in the orifice left by the needle, or a tube of goose quills, fitted one into another to the required length. In the Siberian mines thin slips of wood grooved are employed. With care these expedients served the purpose very well, but accidents, probably due to heedlessness more than anything else, frequently occurred. Sometimes the blast misses fire, but it is very possible that the cartridge material goes on smouldering, so that when the men come back to see what is the matter they arrive just at the moment the whole blows up, and loss of life follows. This is so frequent a source of mischief that there ought to be a strict rule, most rigidly enforced, that when a charge misses fire the men shall be kept back for a quarter of an hour. The safety-fuse was introduced years ago in Cornwall, and was attended with great success. It is a great boon in many districts. In the Isle of Man it has long been used with a remarkable freedom from accidents. Its chief drawbacks are that sometimes a kink or a faulty place may lead to its failure (but this seldom occurs), and it invariably produces a great deal of smoke, and that from the nature of the case in places where it is difficult to get rid of it. Another source of danger arises from the fact that when a bore-hole has really missed fire, the men often begin to bore out the tamping—a dangerous practice, which never ought to be allowed. [Mr. Smyth here exhibited various safety-fuses, and fired one, which, although immersed in a pail of water, maintained its integrity, and the fire passed completely through.]

Of all explosives used for blasting, powder is the most largely used, and continues to be the most popular. It has been, however, proposed, and that many years ago, to mingle with it various substances, and it has been tolerably well made out on the Continent that the effects of powder have not been deteriorated by a moderate proportion of sawdust being mingled with it. Within comparatively a very few years propositions have been made to completely change our explosive agents—as, for instance, by gun-cotton, which seemed to be peculiarly adapted for blasting purposes. It is difficult to enter upon the comparative merits of different classes of explosives, on account of the great jealousies which are indulged in respecting them. This is the case even with powder, every separate manufacture of which has its advocates. Gun-cotton has, however, been most successfully employed in many places, amongst which may be mentioned the important quarries of the Austrian Government up the Danube. In England an improvement in its manufacture was made some time ago, by which it is produced in the form of a rope, and can thus be cut off into convenient lengths. By the newer method, manufactured on a considerable scale by Messrs. Prentice of Stowmarket, it is made into a pulp, and then compressed so as to take up less space. But even in its rope form gun-cotton has an advantage over gunpowder, as, taking weight for weight, it will do five or six times the work of gunpowder. Besides this, 6 ozs. of powder will occupy 8 in. of a bore-hole of given diameter, while 1 oz. of gun-cotton, which has the same explosive power, will take up only 5½ in. Then, gun-cotton makes little or no smoke, although the small vapour it leaves is deleterious, if it may be judged by the sensation of headache and dimness of eyes, which it produces. Another important explosive is nitro-glycerine. A year or two ago I might have said a good deal as to its coming into play with advantage, and its general adoption in this country, particularly in North Wales, where it was much used. Indeed, in some mines and quarries when it was left optional with the men (who for the most part are a careful race, and to be trusted in such matters) to use either gunpowder, nitro-glycerine, or gun-cotton, a considerable proportion preferred nitro-glycerine. They not only found that its explosive force was tremendously greater, but that it was more convenient. Thus, when the bore-hole was completed it had only to be filled full of water, and the nitro-glycerine poured in. By its greater pacific gravity the latter sinks to the bottom, and then the introduction of the fuse, in connection with a copper cap at the bottom, was attended with no difficulty or danger, and the results of the explosions were tenfold. Unfortunately, the carelessness of those who had charge of nitro-glycerine gave rise to fearful accidents last summer, and in a sudden panic, as it seems, an Act of Parliament was passed, which has practically made its use penal. It is true those who want to use it are allowed to make it on the spot, but everyone knows that that permission is of little value, since its manufacture requires a good knowledge of chemistry. Mine agents and managers, therefore, very naturally get rid of the difficulty by giving up its use, and for the present, therefore, in this country it may be said to be tabooed. If, however, the risk attendant upon its conveyance can be got over, it seems a great pity to shut out from mining operations a blasting agent of enormous power and utility. It has, therefore, been prepared in the form of powder, called "dynamite," the invention of M. Nobel, of Hamburg. This powder has all the explosive force of nitro-glycerine, and a great tunnel in America has been accomplished by its aid in half the time, and at a fraction of the expense, which the use of gunpowder would have involved. The terrible accident of last year at Llanberis, and the Act of Parliament, however, which followed, has completely stopped the use of these agencies for blasting in this country. It remains to be seen whether, from its continued use abroad, some safer form of nitro-glycerine may not be discovered, and the legislative restrictions upon their use here be relaxed. Dynamite is not fired like gunpowder, by an increase of temperature, but by some kind of concussion. Thus a little dynamite might be fired here upon a piece of paper by means of a flame, and would do no harm than so much loose gunpowder, but if fired by concussion it would absolutely shatter this hall to pieces. Prof. Abel, director of the Laboratory at Woolwich Arsenal, has discovered that gun-cotton in like manner produces far greater effects when fired by means of a percussion cap; and thus not only has a very curious problem in physics been raised, but one of great practical importance with regard to the application of these new explosives to mining, although that application has received a temporary check for the time being.

GEOLOGICAL SOCIETY OF LONDON.—Jan. 12: (Prof. T. H. Huxley, LL.D., F.R.S., President, in the chair.) John Aitken, J.P., of Bacup, President of the Manchester Geological Society; Edward Allen, 19, St. Saviour-gate, York; Clement Cadle, Gloucester; Arthur Wyatt Edgell, of Lympstone, Exeter; C. J. Leaf, F.L.S., Old Change, and Harrow; and Samuel Joseph Smith, 29, Pancras road, New Wandsworth, were elected fellows of the society. Prof. Otto Torell, of Lund, was also elected a foreign correspondent of the society. The following communications were read:—

1.—"On the Geological Position and Geographical Distribution of the Lithistidæ or Dolomitic Conglomerate of the Bristol Area," by R. Etheridge, F.G.S., palæontologist to the Geological Survey of Great Britain.

2.—"On the Superficial Deposits of portions of the Avon and Severn Valleys and adjoining Districts, by T. G. B. Lloyd, C.E., F.G.S.

3.—"On the Surface Deposits in the Neighbourhood of Rugby," by J. M. Wilson, F.G.S.

On Wednesday the following papers will be read:—1. "On the Crag or Norwich and associated Beds," by Joseph Prestwich, F.R.S., F.G.S.—2. "On the Fossil Corals of the South Australian Tertiary Deposits," by Dr. P. Martin Duncan, F.R.S., Sec. G.S.—3. "Note on a very large undescribed Wealden Vertebra," by J. W. Hulke, F.R.S., F.G.S.

PROTECTION TO MINERS, AND THE EDUCATION OF MINERS' CHILDREN.

A meeting, convened by the Mayor of Oldham in accordance with a numerously signed requisition, was held in the Town Hall, Oldham, on Tuesday, for the purpose of expressing an opinion on the questions as to the more efficient inspection of coal mines, so as to secure greater protection of miners, and the better education of miners' children. In the absence of the Mayor of Oldham (Mr. Hartley, who was prevented by indisposition from attending), the chair was occupied by Mr. Alderman Hadfield.—Amongst other letters which were read was one from Mr. J. Dickinson, Government Inspector of mines, who stated that the accidents which had occurred in the Oldham district were chiefly of that class over which the miners themselves had the most control; more than one-half of the accidents in 1869 being from falls of roofs and coal. He also stated that the law required sufficient ventilation to be constantly kept up.

Mr. W. PICKARD, miners' agent, moved: "That in the opinion of this meeting the repeated explosions in the coal mines of Great Britain, by which so many lives of miners have been sacrificed, loudly call for the interference of the Legislature, and for a better Mines Regulation Bill, which shall make it compulsory to provide better ventilation and a more efficient inspection; and further that a clause shall be inserted in the Bill making it imperative for managers of mines to pass a board of examiners before entering upon the management of mines; also that in the said Bill the education of miners' children shall be amply provided for." Speaking upon the subject of inspection, he said that the present system was a delusion and a snare. There ought to be at least 60 sub-inspectors in different parts of the country, whose duty it should be to go into the mines and witness the workings; for he contended that it was not possible for an inspector to do his duty unless he did go into the mines. He strongly urged upon Government to provide the means of education on behalf of miners' children; and that, as to working hours, miners and their children should have the same protection as other classes of workmen who had the protection of the Factory Acts.

Mr. J. TAYLOR, who seconded the resolution, said he knew from his own knowledge that there were mines in the Oldham district which were recklessly conducted, and he believed that such a Bill as the resolution pointed at would be generally supported by the ratepayers of Oldham.

Mr. J. T. HIBBERT, M.P., in supporting the resolution, said he was glad to attend the meeting for several reasons, chiefly, however, because as a lover of humanity he desired to lessen the number of accidents which year by year took away such a large number of miners, and because he desired to see the children of the working collier educated as well as the children of any other class. Legislation with respect to mines had been of very slow growth. It was 15 years after the first Act was passed with respect to the inspection of mines, and it was not until 1860 that any legislation took place as to the employment of children in mines, and for a better system of inspection. Under that Act it was provided that no child under 12 years of age should be employed in mines, except between the age of 10 and 12 years who could produce a certificate that they could read and write, and had attended school three hours for two days in each week of every alternate month; so that, after 12 years of age, a boy might be worked from Monday morning to Saturday night, provided he had fulfilled the requirements specified. It was not to be wondered at that colliers as a body were ignorant and uneducated. He believed that the present number of inspectors was not sufficient to carry out a proper and regular system of inspection, there being only 12 inspectors for the whole country, whilst the collieries they had to inspect numbered upwards of 3000. He (Mr. Hibbert) fully believed that the present number of inspectors ought to be considerably increased, and was in favour of appointing a number of sub-inspectors, who should visit the pits from time to time without notice, and without expecting to be driven there in the carriage of any person. (Applause.) He found from the official returns that in 1868, 1011 lives were lost in the mines throughout Great Britain, and that the average loss of life was considerably more than 1000 per year. In the West Lancashire and North Wales district there were 126 separate fatal accident, and 237 lives lost, or one life lost to every 135 persons employed, while the average in the collieries of the whole country was one life to every 343 persons employed. He was happy to find that the district of East Lancashire stood in a favourable position when compared with the other districts, as there was only an average of one life lost to every 405 persons employed. The fewest accidents, however, had occurred in Scotland. In 1868 there were 154 lives lost from explosions of powder, 116 of which occurred in the West Lancashire and North Wales district. Mr. Pickard stated that several of the explosions that had occurred in this district arose from defective ventilation. He (Mr. Hibbert) was assured that if proper arrangements and contrivances were made for driving away the bad gases in the mines an explosion from fire-damp could scarcely occur. In Belgium, owing to the scientific arrangements that were made in the mines, explosions were much less frequent than they were in this country. Should it be said that England, with all its science and inventions, did not protect its miners as well as a small country like Belgium? If protection were not secured by the owners, it ought to be secured by the power and force of the Legislature. (Applause.) He should support the proposal that no child under 12 years of age should be allowed to work in a mine, and that children between 12 and 16 should not be allowed to work beyond eight hours per day; but he would make it compulsory upon those children to attend school a certain number of hours every day.—The resolution was carried.

Other addresses were delivered, and the meeting terminated with a vote of thanks to the Chairman.

The Master of the Rolls has appointed Mr. W. H. Holyland, public accountant, of Gresham-street, to be official liquidator of the Perdu Carta Lead Mining Company (Limited).

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